GammaCompMD QA Client Version 5

User Manual

Version 5.1.50

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About GammaCompMD QA Client

GammaCompMD QA is a Display Maintenance and Quality Assurance system specifically developed to maintain Diagnostic Imaging Displays in a Medical Environment and ensure compliance with *Digital Imaging and Communications in Medicine Grayscale Standard Display Function (DICOM GSDF)*.

GammaCompMD QA Client is the part of this system which is installed and used on workstations with NEC diagnostic imaging displays and review display in PACS environments. **GammaCompMD QA Client** can be used stand-alone as well as in a networked Display Maintenance and Quality Assurance environment and allows a user to:

- **Check display status** – current luminance, active backlight hours and remaining backlight lifetime, display temperature and other hardware status information
- **Check PACS display information** - serial number and asset ID, DICOM conformance and historical status data of the connected displays
- **Perform conformance check and re-calibration to DICOM**
- **Check luminance uniformity across the display surface**
- **Match pairs of displays -** Luminance and Color matching to other displays in the field
- **Copy display performance settings from one display to another**
- **Automate maintenance** - schedule calibrations and conformance tests
- **Generate reports of QC tests performed -** following AAPM TG18, ACR AAPM SIIM, and JESRA X-0093 guidelines as well as regional support for DIN V 6868-57, DIN 6868-157 and IEC 62563-1.

- **Different user levels**

GammaCompMD QA Client features an intuitive user interface with three different customizable user levels. The **Advanced** user level contains access to the complete menu and configuration structure, and is aimed at expert users, PACS administrators and Service Providers. A second **Technician** user level has slightly restricted menu options, which are suited to medical physicists and radiographers who need to carry out conformance checks and QA tests. The final **Radiologist** user level is aimed at Radiologists with visual tests, to confirm the DICOM compliance of the display quickly.

- **Automated Procedures**

GammaCompMD QA Client provides a high level of automated procedures. While the **Auto Mode** for a simplified calibration routine and **Scheduled Tests** ensure a more productive work process, automated data backup increases data safety and QA peace of mind.

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- **Full network capability**

With various supported network protocols, NEC displays can be easily integrated and configured into a PACS network infrastructure. The GammaCompMD QA network system performs network communication between **GammaCompMD QA Server** and associated **GammaCompMD QA Client** workstations. These workstations can be either diagnostic imaging workstations or client clinical referral workstations as part of a PACS system.

The GammaCompMD QA network system uses a low bandwidth TCP/ IP socket protocol for communication between Client workstations (maximum 1000) and the Server for display status information, remotely initiated calibrations and conformance tests and central retrieval of calibration and QA test results.

The control center of the GammaCompMD QA Server is HTTP web browser based and therefore the server can be managed from any workplace within the LAN environment on the same site. VPN concepts may be used to manage a network over several physical sites, as long as routing schemes as well as Network Security policies allow the communication.

The following drawing shows the structure of the **GammaCompMD QA Client** software, when installed on a workstation.

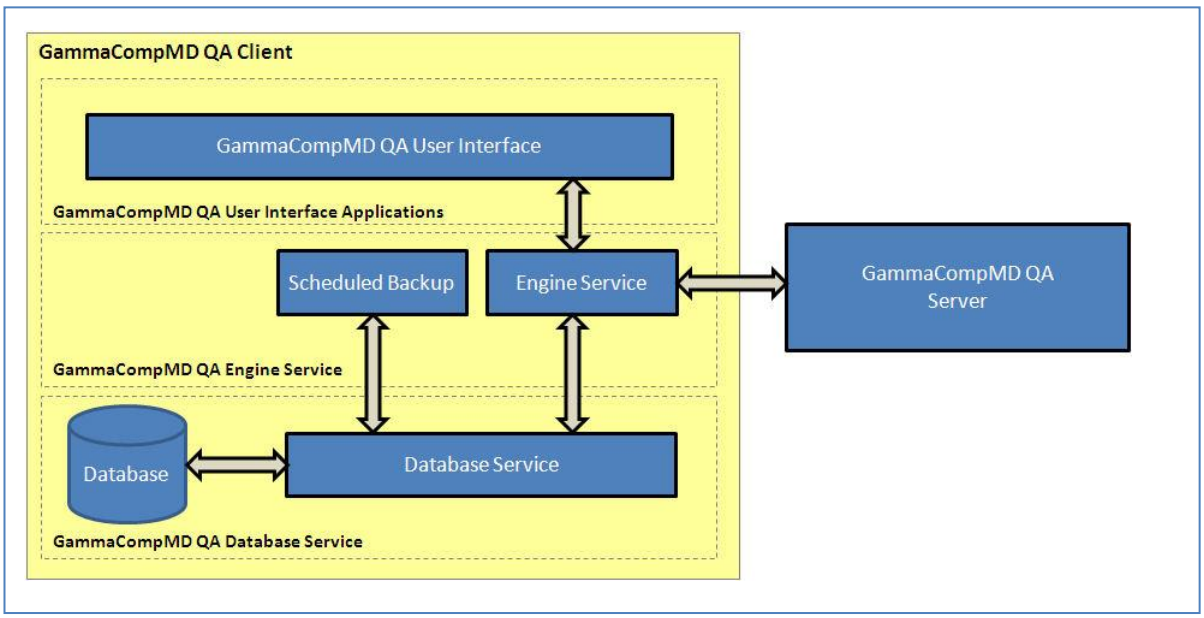

Figure 1: GammaCompMD QA Client software structure

GammaCompMD QA Client consists of several Graphical User Interface (GUI) **Applications** and several **System Services** running in the background, even when no user is logged in.

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The **Applications** are called up from a taskbar icon, where a user - depending on user level - checks display status, does calibrations, conformance tests, QA tests or visual tests.

The three most important **System Services** are:

- **The QAEngine Service**

Communicating with the connected displays and sensors, the **Applications**, the **Database Service** and - when connected - with the **GammaCompMD QA Server**.

- **The Database Service**

Controlling a local database system to save all events and results and communicating with the **Applications** via the **QAEngine Service.**

- **The Scheduled Backup Service**

Taking care of automated backups of the database contents, when enabled and maintained active schedules. During installation of **GammaCompMD QA**, a **GCMDQABackupUser** account is created to manage the background operation of this service.

The communication of these system services with the **Applications** and the **GammaCompMD QA Server** is managed using different IP addresses and different TCP Port addresses. **Therefore it is crucial** for successful installation and operation of **GammaCompMD QA Client** that these addresses are not blocked, firewalled or run in conflict with other applications on the workstation. **GammaCompMD QA Client** is installed with the following IP addresses and TCP Port addresses (numbers) by default:

- **System Service** (including QAEngine service and Backup service):
- IP: Localhost, TCP Port: 53250
- **Database Service:**
  IP: Localhost, TCP Port: 5432

If required, these TCP Port addresses may be modified later with the **7.7.1.2 Reinitialize System Configuration** (page 108) menu.

NOTE: An additional Event Logger system service will be used to communicate with the **GammaCompMD QA Server**, using the server's target IP address and HTTPS protocol with default TCP Port address: 443. This service however is not enabled during Installation. See **7.7.1.2 Reinitialize System Configuration** (page 108) to configure the server connection.

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1. System Environment

1.1. Before you start

This manual contains instructions for using GammaCompMD QA Client software.
GammaCompMD QA Client is designed to run in the following operating environment.
Please check the system environment before installing **GammaCompMD QA Client** software.

1.2. Operating System Environment

- Windows XP professional SP2 or later, 32/64bit (32-bit compatibility mode)
  Japanese/English/German/French/Spanish/Italian
- Windows 7 professional SP1 or later, 32/64bit (32-bit compatibility mode)
  Japanese/English/German/French/Spanish/Italian
- Windows 8 / 8.1 professional , 32/64bit (32-bit compatibility mode)
  Japanese/English/German/French/Spanish/Italian
- An IPv4 / IPv6 based network

1.3. Workstation Hardware

- CPU Minimum: Pentium 4, 1.6 GHz
  Recommended: Core2Duo, 2.1 GHz or greater
- HDD 300MB+ of free space
- Memory Minimum: 512MB
  Recommended: 1GB or greater
- LAN Minimum: 100 Mbps
  Recommended: 1000 Mbps or above

1.4. Display Sensors

- Front Sensors: MD212MC, MD213MC, MD210C2, MD211C2, MD242C2, MD210C3, MD211C3, MD302C4, MD302C6, MD213MG, MD211G3, MD212G3, MD215MG, MD211G5
- Retractable Sensor: MD-N2M5B

1.5. External Sensors

- MDSVSENSOR3 by NEC (USB)
- i1 Display version 2 by X-Rite (GretagMacbeth) (USB)
- Chroma 5 Colorimeter by X-Rite (USB)
- i1Display Pro by X-Rite (USB)
- ColorMunki by X-Rite (USB)

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- i1Pro by X-Rite (USB)
- Spyder3 by Colorvision (USB)
- Konica Minolta CA-210 (RS-232C/USB)
- IBA LXplus (RS-232C) - Color measurement not supported
- Unfors Luxi (RS-232C) - Color measurement not supported
- IBA LXcan(USB) - Color measurement not supported
- IBA LXchroma(USB)

1.6. Pre-requisite Software

- Adobe Reader (Version 7.0 or later) – To display the **Help** file
- An internet browser – To read exported QA Test HTML files (i.e. Internet Explorer 7 or later, Firefox 6 or later).

1.7. Supported Display Models

GammaCompMD QA Client supports the following display models

Supported Display Models	
NEC MultiSync 90 Series	LCD1990SXi
	LCD1990SX
	LCD2090UXi
	LCD2190UXi
	LCD2190UXp
	LCD2190UXi
	LCD2490WUXi
	LCD2490WUXi2
	LCD2690WUXi
	LCD2690WUXi2
	LCD3090WQXi
	LCD1990SXp
NEC MD Series (Grayscale)	MD21GS-2MP
	MD21GS-3MP
	MD205MG
	MD205MG-1
NEC MD Series (Display Sensor Model / Grayscale)	MD213MG
	MD215MG (USB cable required)
	MD211G3
	MD212G3 (USB cable required)
	MD211G5 (USB cable required)

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NEC MD Series (Color)	MD21M
	MD304MC
	MD301C4
	MD322C8
NEC MD Series (Display Sensor Model / Color)	MD212MC
	MD213MC
	MD210C2
	MD211C2
	MD242C2
	MD210C3
	MD211C3
	MD302C4
	MD302C6 (USB cable required)
NEC EA Series	EA193Mi
	EA224WMi
	EA234WMi
	EA244WMi
	EA244UHD
	EA273WMi
	EA274WMi
	EA275WMi
	EA275UHD
	EA294WMi
	EA304WMi
	EA305WMi
NEC MultiSync PA Series	PA231W
	PA241W
	PA271W
	PA301W
	PA242W
	PA272W
	PA302W
	PA322UHD
NEC MultiSync P Series	P241W
	P232W

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	P242W
NEC Public Display Series (For displaying medical images)	X651UHD
	X841UHD
	X981UHD
NEC large format models **Note:** **Gamma correction only, manual adjustment of luminance is required**	Multeos M40
	Multeos M46
	Multeos LCD M401
	Multeos LCD M461
	LCD 4020
	LCD 4620
	LCD 5220
	LCD 6520L
	LCD 6520P
	LCD X461UN
	LCD X461HB
	LCD P401
	LCD P461
	LCD S401
	LCD S461
	LCD S521
	LCD P521
	LCD P402 *Using DVI connection only
	LCD P462 *Using DVI connection only

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2. Checking System Dependencies

2.1. External Sensors

External sensor drivers are included with the GammaCompMD QA Client. Please install GammaCompMD QA Client before connecting any external sensor to the system. If multiple external sensors are connected simultaneously, they will not be correctly identified. Please connect only one external sensor.

2.2. Attaching MD-N2M5B Sensors and External Sensors

The NEC MD-N2M5B external sensor can be used to perform automated calibrations on some display models. Some MD-N2M5B sensors and external sensors cannot be stopped by the operating system (the **[Safely Remove Hardware]** icon is not shown in the taskbar). To remove a sensor that does not have this icon, only remove it after checking that the sensor is not in use. It is recommended that the sensor be removed after stopping the GammaCompMD QA Client.

2.3. Updating GammaCompMD QA Client with MD-N2M5B sensor(s)

If updating from GammaCompMD QA Client Version 4.0.10, the settings of MD-N2M5B sensor will be discarded. Set it up again after upgrading. For more information about sensor settings, refer to **7.2.6 Sensor Setup** (page 77).

2.4. Using the CA-210 Color Analyzer

If connecting with serial communication, set the baud rate for the sensor unit to 9600bps. The sensor will not be detected if it is set at another baud rate. Settings are not necessary when connecting with USB communications. Also, special modes set at the CA-210 (MEAS or 0-CAL) will not be recognized by GammaCompMD QA Client. Please follow the instructions displayed at the start of calibration and startup to properly set the mode. You cannot use a CA-210 which supports two or more measuring probes. Only one probe connection is supported. Please refer to detailed instructions how to use this instrument in the CA-210 user manual.

2.5. Using the IBA LXplus instrument

For ambient light measurement, the optional lux sensor needs to be attached to the LXplus instrument. Please turn the LXplus power to OFF when attaching / detaching the Lux sensor. At this time, be careful to not pull out the USB cable when performing USB communications with a USB - serial conversion adapter. Please refer to detailed instructions how to use this instrument in the LXplus user manual.

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2.6. Using the IBA LXcan or LXchroma instrument

For ambient light measurement, the optional LxLs lux sensor needs to be attached to the LXcan or LXchroma instrument. Please turn the LXcan or LXchroma power to OFF when attaching / detaching the Lux sensor. Please refer to detailed instructions how to use this instrument in the LXcan or LXchroma user manual.

The screen contact mask is needed for measuring directly on screens.

The distance mode requires a distance of about 50 cm for measuring, an ultrasound range finder is integrated in the LXcan or LXchroma. On the display, the distance is shown as an arrow indicating in which direction the device must be moved to reach the right measurement distance.

2.7. Using the Unfors Luxi (new product name: Raysafe Solo Light) instrument

It is equipped with a light detector which can be used for both measuring display luminance and ambient light. Please turn the sensor's power OFF when enabling / disabling the ambient light detector. Be careful to not pull out the USB cable when performing USB communications with a USB - serial conversion cable.

NOTE: Only Unfors Luxi instruments equipped with firmware version 5.05 or later are supported by GammaCompMD QA Client software. Please refer to detailed instructions in the Unfors Luxi (XI Kit) User Manual.

2.8. Using the Windows Power Management Option

When the power management option is used in Windows XP (or when the Microsoft “Windows PC Automatic Energy-Saving Program” is used), an external sensor may not be recognized after the system returns from standby or sleep mode. If a sensor is not recognized, remove it, reconnect it, and check that the external sensor automatic detection and calibration are working normally.

2.9. Using Displays without PIP Support

With a display model not supporting PIP MODE, GammaCompMD QA Client cannot be used when the display is connected using multiple inputs (e.g. DVI input + DisplayPort input) through cables to one or more workstations. Please make sure that only one input is connected to the display before using GammaCompMD QA Client. Also, please perform a re-initialization of the display configuration when you disconnect/reconnect display cables to change connection.

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2.10. Calibration, Test, Level Measurements, and QA Testing

Do not turn off power, enter the power management manually (from OS side), unplug cables, or remove external sensors' USB cables during calibration, conformance test, uniformity test, white/black level measurements or QA tests, as doing so will have a negative effect on accuracy. If re-initialization is necessary, follow the instructions in **7.7.1.1 Re-initialization of Display** Configuration (page 105).

2.11. Lost Password

User passwords must be set by a user with (local) administrator rights.
GammaCompMD QA will need to be reinstalled if the **Advanced User** password is lost.

2.12. Using NEC MD215MG

When using the MD215MG model, some additional action is required to support this model within GammaCompMD QA Client, including connecting a USB cable from the computer to the monitor. Please refer to **13 MD215MG EDID Serial Number Update Tool** (page 168).

2.13. Using NEC MD211G5

When using the MD211G5 model, connecting a USB cable from the computer to the monitor is required for communication.

2.14. Using NEC MD302C6

- When using the MD302C6 model, connecting a USB cable from the computer to the monitor is required for communication.
- When you use external sensor, use a color sensor.
- If a signal cable is changed after installation or calibration, please execute re-initialization of the display configuration and execute re-calibration. Regarding how to operate, refer to **7.7.1.1 Re-initialization of Display Configuration** (page 105) and **7.2 Calibration** (page 54).
- If an external sensor was used for the calibration, the actually calibrated luminance will be slightly lower than the selected target luminance.
  - ✧ This effect will happen under the following conditions:
    - OS: Windows7 or later
    - Display controller: Display Port 10-bit output is enabled.

  Countermeasure: Disable 10-bit support (NVIDIA Quadro Series factory default: Enabled) or keep 10-bit support disabled (AMD Firepro Series factory default: Disabled).

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2.15. Using NEC X651UHD/X841UHD/X981UHD

➢ If GCMDQA has not recognized the NEC model X651UHD, X841UHD and X981UHD, check the following using the ON-SCREEN-DISPLAY (OSD) menu of this large format display

- SPECTRAVIEW ENGINE is' ON'.
- DDC/CI is 'ENABLE'.

(Refer to the display's documentation for details.)

2.16. Using NEC MD212G3

When using the MD212G3 model, connecting a USB cable from the computer to the monitor is required for communication.

2.17. Using M-Series Display Controllers from Matrox

When using M-Series display controllers from Matrox while the system is logged off, any scheduled executions will not function. Also, when logging on to Windows after it was once logged off, there may be cases where the displays are not correctly recognized by GammaCompMD QA Client. In this case, please execute re-initialization of the display configuration. Regarding how to operate, refer to **7.7.1.1 Re-initialization of Display** Configuration (page 105).

2.18. ECO mode, Auto brightness, and Human sensing function

When using EA Series model, please turn off the above functions manually before the calibration.(Refer to the display's documentation for details.)

When using MD211C3, MD210C3, MD211C2, MD210C2, MD242C2 or MD302C4 models, Human Sensing is turned OFF automatically while each function runs. Human Sensing returns to original setting after each function runs. If a display entered into power saving mode by Human Sensing, a display will return form power saving mode before running each function.

When the calibration will be started, the display will perform a warm-up after having returned from power saving mode.

2.19. Using Windows 8 / 8.1

- If you want to upgrade from Windows 7 to Windows 8 / 8.1, and GammaCompMD QA was installed, a seamless operation of GammaCompMD QA cannot be guaranteed. For this case, the following operation is recommended:
  (1) Backup data before an upgrade to Windows 8 / 8.1. Refer to **3.6 Database Backup** (page 32).

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(2) Uninstall GammaCompMD QA.
(3) Upgrade to Windows 8 / 8.1.
(4) Re-Install GammaCompMD QA.
(5) Restore Backup data. Refer to **7.7.1.2 Reinitialize System Configuration** (page 108).

If restoring backup data (history) is not desired, only perform step (2), (3) and (4).

- GammaCompMD QA Client performs as Desktop Application.

If Start Screen (**Figure 2**) and/or Modern UI Application (Windows Store apps) are shows, the execution of network and/or schedule tests are suspended. You need to close the Start Screen or Windows Store apps. When the Desktop is shown, the execution of network and/or schedule tests starts.
While the schedule test and/or the execution of network performs, a Main Screen can't be started. If you need to operate a Main Screen, complete, cancel or postpone the execution of network and/or the schedule test before operating a Main Screen.

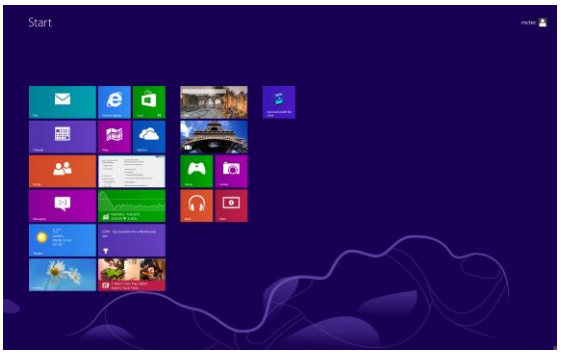

Figure 2: Start Screen of Windows 8 / 8.1

- Do not change to the Start Screen and Windows Store apps during execution of GammaCompMD QA Client.
- Do not show the charm bar during execution of GammaCompMD QA Client.
- Launch GammaCompMD QA Client after canceling a snap view.
- LXcan and LXchroma are not supported on Windows8.1.
- When using MD215MG, MD211G5, MD212G3 or MD302C6 on Windows8.1, it may cause GammaCompMD QA Client to malfunction. In this case, disable **[USB Selective Suspend]** in Windows 8 / 8.1.

2.20. Common Dialog Box Conventions

GammaCompMD QA Client displays separate dialog boxes for each of its features. The following describes the function of buttons and checkboxes in the dialog boxes.

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- **Dialog boxes with only an OK button**

Clicking **OK** closes the dialog box. When displaying a dialog box with display selection buttons again, the previous selections are cleared. Make the selections again.

- **Dialog boxes with OK and Cancel buttons**

Clicking **OK** performs the intended action (enables setting / start calibration / view report). Clicking **Cancel** closes dialog box without applying any changes.

- **Dialog boxes with OK, Cancel, and Apply buttons**

Clicking **OK** enables settings and closes the dialog box. Clicking **Cancel** cancels any change and closes the dialog box. However, the settings that were applied by clicking the **Apply** button will not be changed back. Clicking **Apply** applies settings but does not close the dialog box.

- **Dialog boxes with OK and View buttons**

Clicking **OK** closes the dialog box. Clicking **View** will cause all changes to be lost in dialog boxes with checkboxes. Clicking **View** will show the test pattern.

- **Checkboxes**

Select All/Deselect All Checkboxes
Checking these will check all available items in dialog box.
Un-checking this will deselect all available items in the dialog box.

NOTE: When the checkbox is in a tab such as in **7.7.1.5 Alert Setup** (page 116), it affects only those checkboxes in the currently selected tab.

- **Windows Commands, Menus and Messages**

All instructions and menu references related to the Windows operating system are shown within brackets.
Example: Select the **[General]** tab on the **[Windows Firewall]** screen.

2.21. Using PIP Enabled Displays

PIP MODE supported display models are able to display information from more than one input on one screen at the same time. Please refer to the display's user manual for details.

GammaCompMD QA Client can handle configurations where two or more inputs are

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displayed on one screen. Set up the input sequence, screen order in Windows and the display area according to the example settings shown on the next page.

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- Examples for correct setup

Screen order in Windows setting view and actual display screen should be the same.

Screen setting in Windows

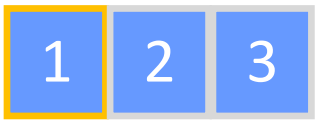
Screen setting on display

(a) Correct example 1

Screen setting in Windows

(b) Correct example 2

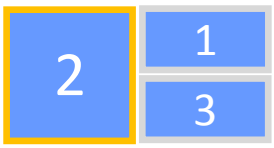
Screen setting in Windows



Screen setting on display

(c) Correct example 3

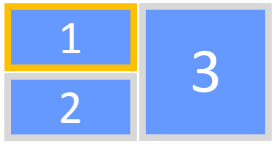
Screen setting in Windows



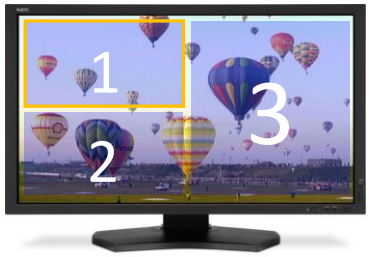
Screen setting on display

(d) Correct example 4

Screen setting in Windows

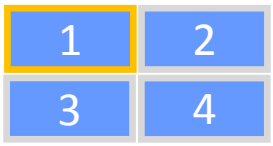


Screen setting on display



(e) Correct example 5

Screen setting in Windows



Screen setting on display

(f) Correct example 6

Figure 3: Examples of correct display settings when using PIP MODE

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When you perform a calibration, luminance measurement or QA test, PIP MODE will be turned off automatically. You can test the correct input, using the following:

1. Manually turn “PIP MODE” OFF on the display via control button.
2. For case (a), (c), (e) and (f), you should only see the image of display area #1, otherwise changes in connection sequence are required. For case (b) and (d), change some settings to see the image of display area #2 image as well.
3. Turn ON “PIP MODE (PbP) (hereinafter referred to as PbP)” and reconfirm the screen order.
4. Refer to the display's documentation for PIP MODE. The identification of the display within Windows can be changed by settings of the screen resolution. Perform procedure 1 to 3 if you changed settings.

- Examples of incorrect setup (I.e. changing the settings via the OSD’s SWAP function)

Screen order in Windows setting view and actual display screen are mismatched.

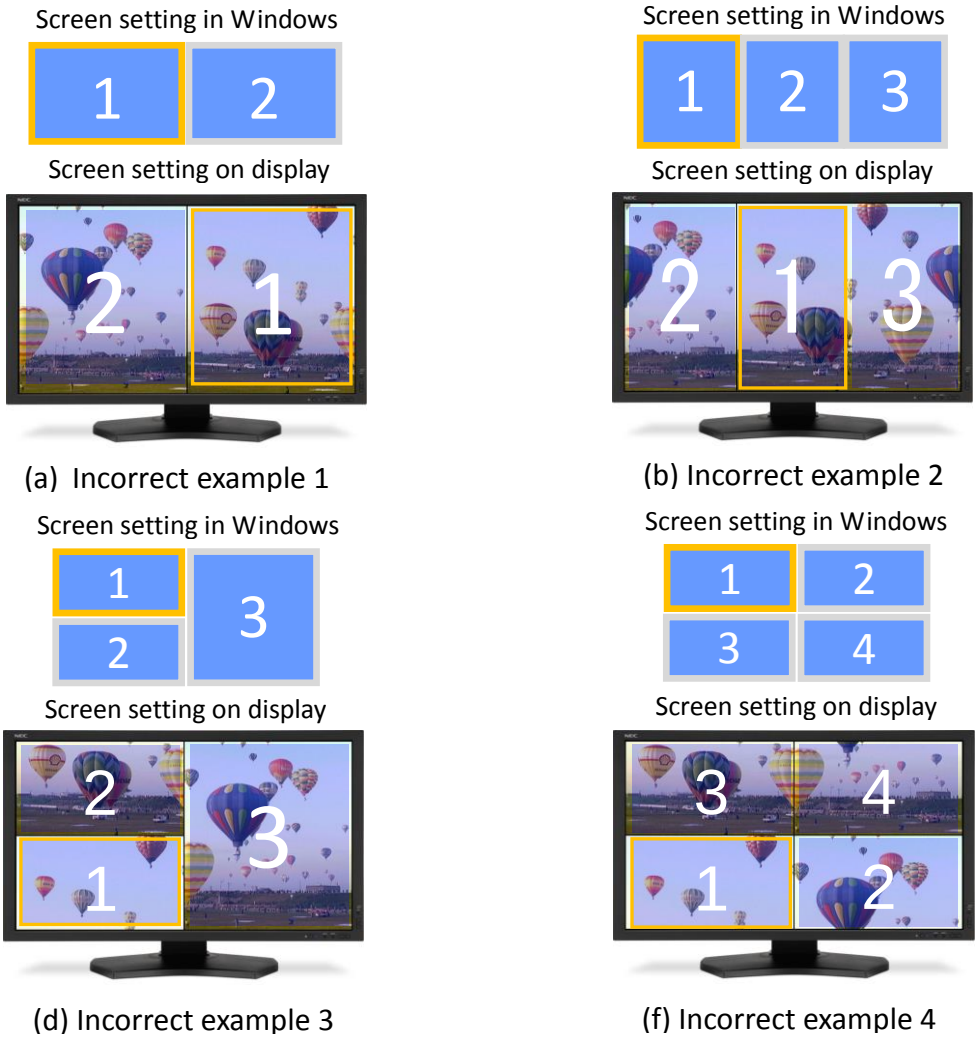

Figure 4: Example of incorrect display setting when using PIP MODE

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If the main screen setting is correctly done, **Sensor Contact Position Guide** (Figure 57) will be shown before calibration or taking other measurements starts. If QA Test starts, the following message (Figure 5) will be shown before calibration or taking other measurements starts.

When the circle and the rectangle are displayed correctly related to the center of screen, the user is allowed to continue the operation.

If the circle and the rectangle are displayed incorrectly, click the cancel button. In this case, execute **7.7.1.1 Re-initialization of Display** Configuration (page 105) after setting according to the correct example.

Click on Continue when the circle and the rectangle are displayed correctly related to the center of the screen.
If the circle and the rectangle are not located correctly, measurements will not deliver correct results.
Please click on Cancel to stop the operation and reconfigure your Operating System display settings correctly. Then execute the menu item "Reinitialize Display Configuration" and try again.
Continue
Cancel

Figure 5: Continue Operation dialog

When the main screen setting is not correctly done, the following message (Figure 6) may be shown. In this case, please check and redo the setting.

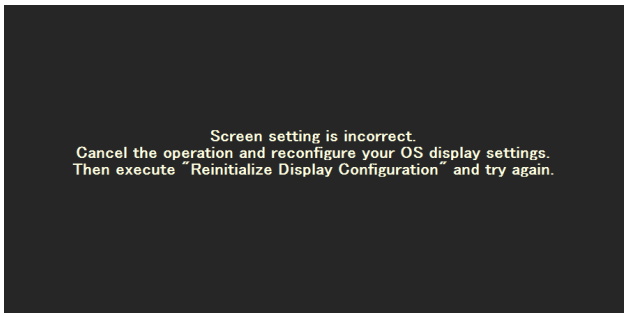
Screen setting is incorrect.
Cancel the operation and reconfigure your OS display settings.
Then execute "Reinitialize Display Configuration" and try again.

Figure 6: Abort Operation dialog

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IMPORTANT NOTES:

・Unlike other sensors, retractable sensor executes calibration automatically when connected to the system. As long as PIP MODE main screen setting is correctly done, calibration will be completed properly without showing **Sensor Contact Position Guide** (**Figure 57**) or **Continue Operation dialog** (**Figure 5**). If the screen is not correctly set, calibration will stop with an error message. Please set up PIP MODE correctly again and re-execute the calibration.

・If the buttons of the **Sensor Contact Position Guide** (**Figure 57**) or **Continue Operation dialog** (**Figure 5**) are not shown, push the ESC key to cancel the operation.

・When displaying two or more inputs on one screen, it is necessary that both inputs are connected to the same display controller. Displays cannot be managed properly when each input is connected to a different display controller.

・When displaying two or more inputs on one screen, please connect the signal cables of same connector type (Display Port/DVI/HDMI) to the display.

・Any change of Windows display settings or display controller or input or connection of a different display typically requires an update of configuration settings. In such a case, please execute “Re-initialization of the Display Configuration” in GammaCompMD QA Client.

・Executing QA Test with PIP MODE equipped displays will always show **Continue Operation dialog** (**Figure 5**) regardless of PIP MODE setting (ON/OFF). If the screen configuration is correct, press “Continue” to continue your operation.

・If using this function on a display with PIP MODE (PbP), you need to input the appropriate resolution on the screen to perform correctly the visual test. When you change the resolution manually, please return to the original settings after the visual test.

・When the display sensor (Front sensor model or Retractable sensor) is used, be sure to set the both the EXPANSION mode and the PIP MODE to “FULL” in the ON-SCREEN-DISPLAY (OSD) of the display.

・Please set the PIP MODE not to "Picture in Picture" but to "Picture by Picture".

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・If the operation with the PIP MODE (PbP) goes wrong, connect the PC with the display using an USB cable. This is an alternative way of communication between PC and Display.
Refer to the display's documentation for details.
・If the restoration of PIP MODE (PbP) from OFF to ON takes unusually long time, connect the PC with the display using an USB cable. Refer to the display's documentation for details.

・After the calibration, the BLACK LEVEL value may return to the value before the calibration when PIP MODE (PbP) is set to OFF or ON. In this case, please set the value of BLACK LEVEL to 50.0% by the OSD menu.

・In MD302C6, when two inputs of INPUT1+INPUT2 will be displayed, both inputs should use the same type of connector, and set up to the same resolution. Set up coordinates according to correct example.

・If the calibration with the PIP MODE(PbP) goes wrong, execute 7.7.1.1 Re-initialization Display Configuration after setting PIP MODE to OFF. Execute calibration again after re-initialization.

・When displaying two or more inputs on one screen, please unify Picture Mode setting, Luminance setting, Contrast setting, and Black level setting via the ON-SCREEN-DISPLAY (OSD) menu.
Refer to the display's documentation for details.

・When an upgrade installation was done while PIP MODE (PbP) has been in ON state, please execute **7.7.1.1 Re-initialization of Display** Configuration (page 105).

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3. Installation

Administrator privileges are required in order to install this software. If the user does not have administrator rights, a prompt will appear requesting an administrator's username and password. Follow the on-screen instructions to continue with the installation.

Selecting **Only for me** in **Select Options dialog box** (**Figure 8**) will set the input ID as the current user and a desktop shortcut will be created for the **[Administrator]** account. Selecting the **Anyone who uses this computer (all users)** option will allow also **[Standard User]** accounts to run GammaCompMD QA Client.

External sensor drivers are included in the **GammaCompMD QA Client** package as described in **1.5 External Sensors** (page 10). Install GammaCompMD QA Client before connecting sensors to the computer. GammaCompMD QA Client can be installed by double clicking **setup.exe** from your **GammaCompMD QA Client** installation media or download package**.**

NOTE:

・GammaCompMD QA Version 5 cannot be installed on a system which has GammaCompMD Version 2, GammaCompMD QA Version 3, or SpectraView II installed as well. The installation will stop, notifying the user of the conflicting software.
Un-install these applications, as required.
You may re-install GammaCompMD QA Version 3 or SpectraView II to use them after GammaCompMD QA Client Version 5 has been installed.
Please do not use GammaCompMD QA Client Version 5, GammaCompMD QA Client Version 3 and SpectraView II concurrently, because connected displays may not be set up correctly, as these programs work with the same access method to control the displays, resulting in access conflicts.

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3.1. Setup

NOTE: If GammaCompMD Version 2 or GammaCompMD QA Version 3 Client is still installed on the system, these need to be un-installed manually before this setup.

When installation begins, a **Choose Setup Language** (Figure 7) and then an **Options Selection** (Figure 8) dialog box will be displayed. Follow the instructions accordingly for any other dialog boxes that may appear. In addition, a Readme file is shown. After reading the contents, click on the x to exit.

- **Language Selection**

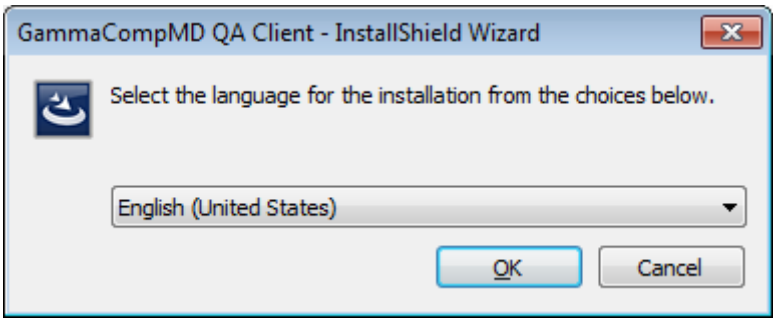
GammaCompMD QA Client - InstallShield Wizard
Select the language for the installation from the choices below.
English (United States)
OK
Cancel

Figure 7: Choose Setup Language dialog box

Select your language for the installation from the **Choose Setup Language** dialog box.

NOTE:
・If you select Japanese during installation in other than Japanese version of Windows XP, you need to insert “East Asian languages” in advance. Please set up “East Asian Languages” from the “Region and Language” in “Control Panel” before the installation.
・If you perform an upgrade, it will be executed in the same language which you selected during first installation.

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- **Options Selection**

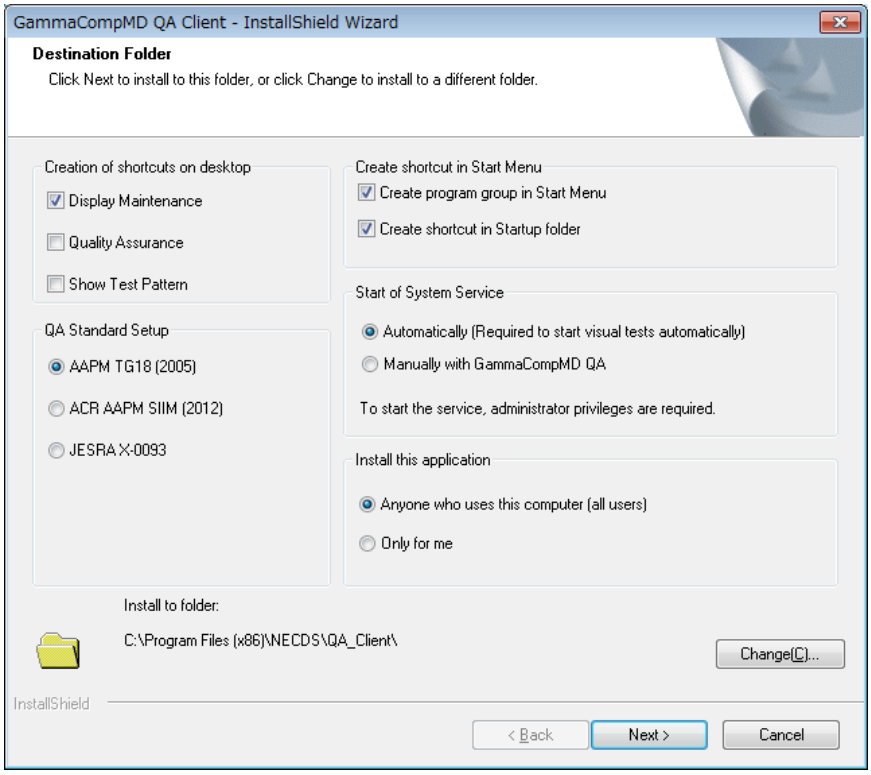
GammaCompMD QA Client - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Creation of shortcuts on desktop
Display Maintenance
Quality Assurance
Show Test Pattern
QA Standard Setup
AAPM TG18 (2005)
ACR AAPM SIIM (2012)
JESRA X-0093
Create shortcut in Start Menu
Create program group in Start Menu
Create shortcut in Startup folder
Start of System Service
Automatically (Required to start visual tests automatically)
Manually with GammaCompMD QA
To start the service, administrator privileges are required.
Install this application
Anyone who uses this computer (all users)
Only for me
Install to folder:
C:\Program Files (x86)\NECDS\QA_Client\
Change(C)...
InstallShield
< Back
Next >
Cancel

Figure 8: Options Selection dialog box

This box is available to select the following installation options.

- **Creation of desktop shortcuts**
  Display Maintenance / Quality Assurance / Show Test Pattern)
- **QA Standard Setup**
  (AAPM TG18 / ACR AAPM SIIM / JESRA X-0093)
- **Create shortcut in Start Menu**
  (Start Menu / Startup Menu)
- **Start of System Service**
  (Automatically / Manually)

NOTE: System Service refers to installed Windows System Services. These system services access the database, control the display and communicate with a **GammaCompMD QA Server**.

If **Automatically** is selected, these services are started at boot up time of the system and run permanently in the background, even if no user is logged in.

If **Manually with GammaCompMDQA** is selected, these services must be manually started, using the following steps: Open **Display Maintenance** menu, then enter:

→ **System Setup** → **Reinitialize System Configuration**

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- **Install this application**
  (Anyone who uses this computer (all users) / Only for me)
- **Install to folder:**
  By default, GammaCompMD QA will be installed in the following folder:
  Windows 32-bit versions C:**[Program Files]**\NECDS\QA_Client
  Windows 64-bit versions C:**[Program Files(x86)]**\NECDS\QA_Client

NOTE: In the following, this user manual refers to these folders as **[Installation Folder]**.

EU Limited Edition:

If you are using GammaCompMD QA Client for EU, you can select QAXRAY (IEC 62563-1/DIN V 6868-57/DIN 6868-157) at the time of installation. (**Figure 9**). When you select QAXRAY, the installation dialog box for QAXRAY will be displayed during the installation. Install QAXRAY according to the message of the dialog box. Please note: If the installation of QAXRAY is canceled, the installation of GammaCompMD QA Client will be canceled as well.

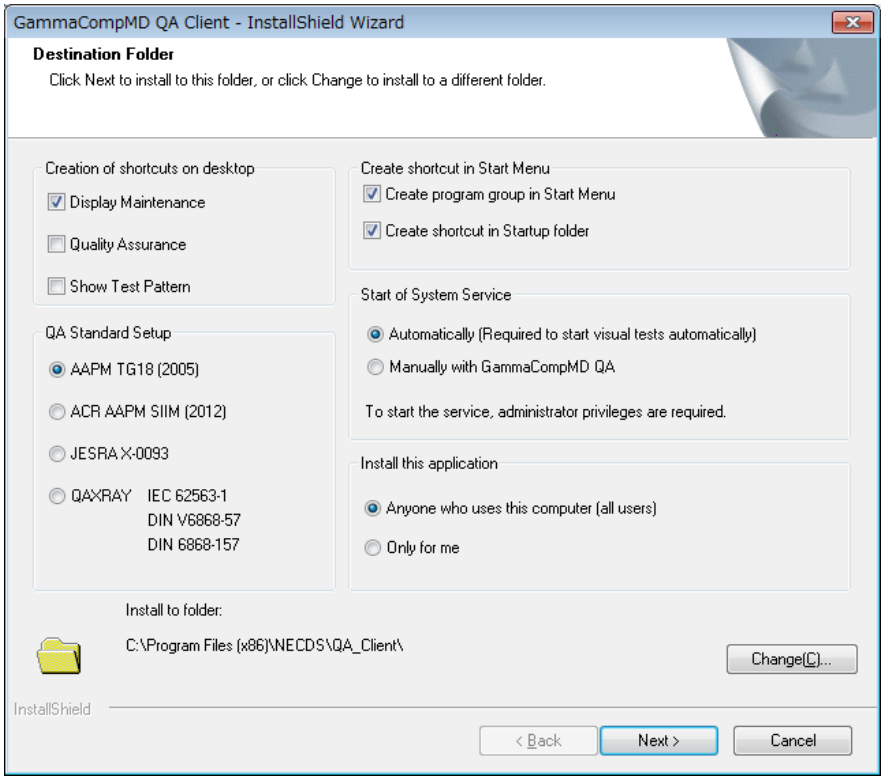
GammaCompMD QA Client - InstallShield Wizard
Destination Folder
Click Next to install to this folder, or click Change to install to a different folder.
Creation of shortcuts on desktop
Display Maintenance
Quality Assurance
Show Test Pattern
QA Standard Setup
AAPM TG18 (2005)
ACR AAPM SIIM (2012)
JESRA X-0093
QAXRAY IEC 62563-1
DIN V6868-57
DIN 6868-157
Create shortcut in Start Menu
Create program group in Start Menu
Create shortcut in Startup folder
Start of System Service
Automatically (Required to start visual tests automatically)
Manually with GammaCompMD QA
To start the service, administrator privileges are required.
Install this application
Anyone who uses this computer (all users)
Only for me
Install to folder:
C:\Program Files (x86)\NECDS\QA_Client\
Change(C)...
InstallShield
< Back
Next >
Cancel

Figure 9:Options Selection dialog box (EU Limited Edition)

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3.2. Installation of the internal database

During the installation process, GammaCompMD QA also installs a PostgreSQL database, as shown in **Figure 10**.

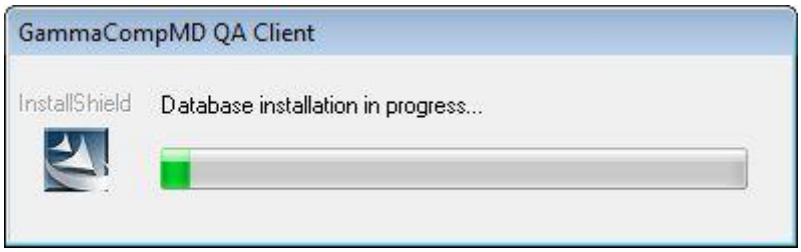

Figure 10: Database installation in progress…

This database is used to save all calibration actions, measurement data, QA tests and alerts and to build a history of the status of the connected display over time.
In addition, the database is used for providing actual and historical data, when the Client communicates with a **GammaCompMD QA Server** in a networked environment.
In case that a problem occurs during database installation or initialization, a message pops up with an error code. Below find a small list of error codes and a short description related to the installation/initialization of the **GammaCompMD QA Client** internal database during installation.

Error Code	Description
8	Database connection error
13	Cancelled by another process
26	Database initialization error
33	Exceptional error in database

- **GammaCompMD QA Client** assumes that the user installing this application has full (local) administration rights.
- The database communicates with the main application and with other system services via IP address (127.0.0.1; localhost) and TCP port number: 5432.

To find the cause of an installation failure, please check (among other possible causes):

- Are there any limitations to the local administrator rights, or is an automatic creation of an account blocked, i.e. via Microsoft's advanced group policy management?
- Any TCP port conflicts with other applications, or any firewall port blocking?
- Does the system run another PostgreSQL or other database installation?

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3.3. Finishing the installation

A dialog box will appear indicating the installation has finished, **Installation Complete** dialog box (**Figure 11**) is displayed.

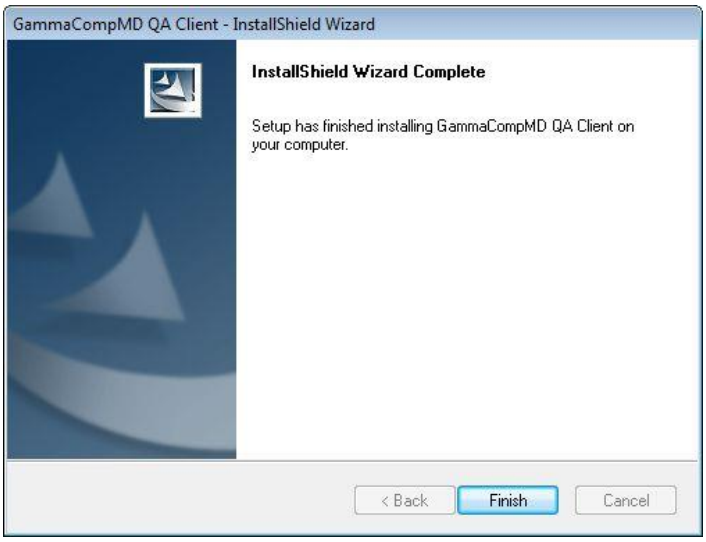

Figure 11: Installation Complete dialog box

3.4. Options to consider during installation

- **Backup User Account**

GammaCompMD QA Client automatically creates the following account:

"**GCMDQABackupUser**" account for backup features

[WARNING] Do not edit the account. It may cause GammaCompMD QA Client to malfunction.

- **Installation Location for USB Sensor Drivers**

Sensor Model	Driver Install Location
ColorMunki	[Installation Folder]\drivers\ColorMunki
Chroma5	[Installation Folder]\drivers\GretagMacbeth
Spyder3	[Installation Folder]\drivers\Spyder3
Xrite i1 Series	[Installation Folder]\drivers\XriteEyeone
CA-210	[Installation Folder]\drivers\CA-210

USB sensor models which are not listed above, will use the standard USB driver included in the OS.

- **Installation Confirmation Dialog for Sensor Drivers**

The software installation confirmation dialog in **Figure 12** may be displayed during the

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GammaCompMD QA Client installation. If this dialog is displayed, click on the Continue button.

Software Installation
Continuing your installation of this software may impair or destabilize the correct operation of your system either immediately or in the future. Microsoft strongly recommends that you stop this installation now and contact the software vendor for software that has passed Windows Logo testing.
Continue Anyway
STOP Installation

Figure 12: Software Installation confirmation dialog

3.5. Un-installation

This application can be un-installed in two different ways:

- **Using the Windows Control Panel**

Windows XP: **[Start Menu]** → **[Control Panel]** → [**Add or Remove Programs**] and double-click on **GammaCompMD QA Client** to un-install.

Windows 7: **[Start Menu]** → **[Control Panel]** → **[Category View]** → [**Uninstall a program**] and double-click on **GammaCompMD QA Client** to un-install.

Windows 8/ 8.1: Press the **[Windows key]** and the **[X key]** are simultaneously, then go to **[Control Panel]** → **[Category View]** → [**Uninstall a program**] and double-click on **GammaCompMD QA Client** to un-install.

- **Using the GammaCompMD QA Installer**

Double-click on **setup.exe** in your **GammaCompMD QA Client** Installer source (CD-ROM, DVD-ROM, stored locally or on a network drive.

3.6. Database Backup

Backup display information, calibration, and QA test results can be viewed by re-installing GammaCompMD QA Client and restoring from the backup, using the **7.7.1.2 Reinitialize System Configuration** (page 108) option.

During un-installation, a dialog box will be displayed, asking if existing QA data should be backed up, as shown in **Figure 13**.

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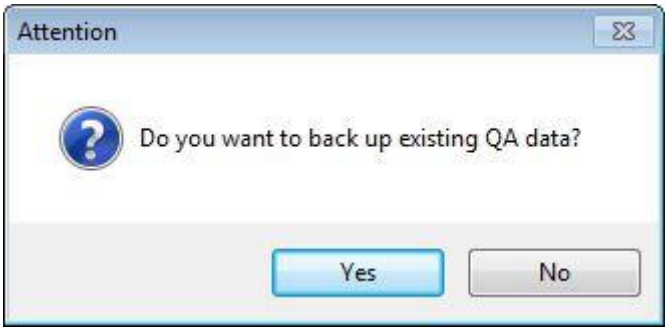

Figure 13: Backup confirmation

Click **Yes** to create a backup. Click **No** to continue without making a backup.
Backed up files are saved as follows:

Windows XP: C:**[Documents and Settings]****[ALL Users]****[Documents]**
Windows 7 and windows 8 / 8.1: C:**[Users]****[Public]****[Documents]**

NOTES:

- The backup filename is created in the following format**:**

[Computer Name] Year Month Day Hour Minute Second.gcmddat

Example**:** The filename for a backup made at 1**:**15**:**30 p.m. on September 1, 2011 under the computer name Medical would be: ***MEDICAL20110901131530.gcmddat*****.**

Database restoration is only possible using the **same GammaCompMD QA Client** version which was used to create the backup. Restoration with a newer version leads to inconsistent data in the database. The restore operation with a newer version will actually be aborted.

- An installation folder may not be deleted after un-installation. If necessary, you can delete it manually.

3.7. Version Upgrades

Older versions of GammaCompMD QA Client will be upgraded when installing a newer version. **Do not un-install the previously installed version of GammaCompMD QA before an upgrade, if you want to keep history data.** All database content (history data) of the previous version will be converted (if required) and then read into the new version's database to keep all history data.

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NOTE:

If you connected a NEC display that is not supported by GammaCompMD QA, it will be recognized as "StdDisplay". In that case, Initial target luminance will be set to 200cd/m2, and the grade of quality assurance test will be set to match to the target luminance. If this display is supported by a future version of GammaCompMD QA and you install this new version as an upgrade, the following configuration information will be kept.

- Calibration configurations
- Alert configurations
- Grade of quality assurance test

Please check and re-configure this Information manually, if required.

Refer to 15.2 **Saved Settings for Upgrade** (Page 177) for the saved settings by upgrade installation.

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4. Firewall Settings

An active firewall may block network communication between a **GammaCompMD QA Client** and a **GammaCompMD QA Server**, if a firewall is enabled. The following description refers to the integrated firewall within Windows.

4.1. Windows XP

- **Opening the Windows Firewall**

Click **[Start]** on the task bar, then click **[Control Panel]** → **[Windows Firewall]**.
The **[Windows Firewall]** screen is displayed.

- **Enabling the Firewall**

Select the **[General]** tab on the **[Windows Firewall]** screen. The Windows Firewall general screen, as shown in **Figure 14**, is displayed. Select **[ON]** and do not check the **[Do Not Allow Exceptions]** box.

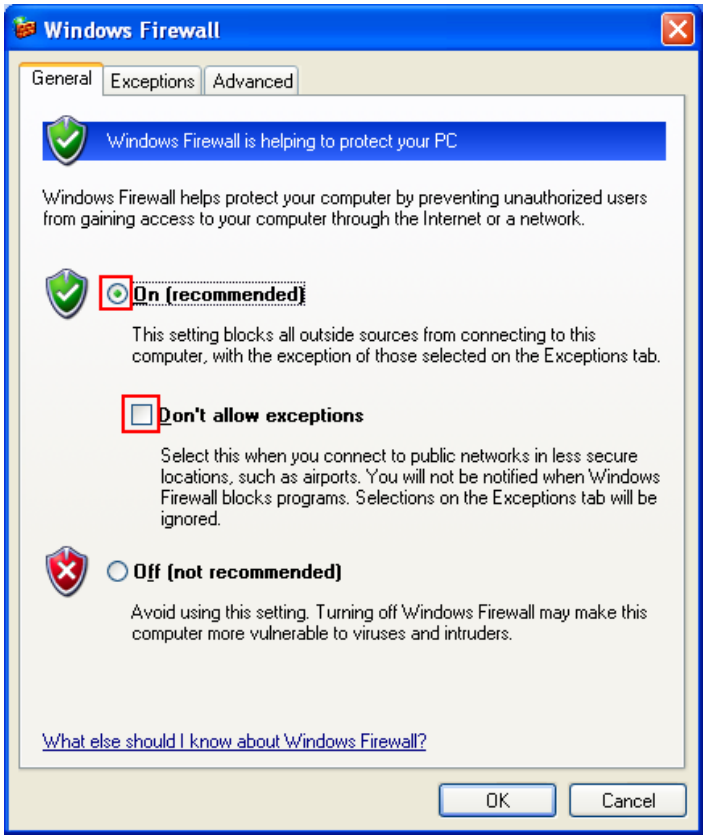
Windows Firewall
General
Exceptions
Advanced
Windows Firewall is helping to protect your PC
Windows Firewall helps protect your computer by preventing unauthorized users from gaining access to your computer through the Internet or a network.
On (recommended)
This setting blocks all outside sources from connecting to this computer, with the exception of those selected on the Exceptions tab.
Don't allow exceptions
Select this when you connect to public networks in less secure locations, such as airports. You will not be notified when Windows Firewall blocks programs. Selections on the Exceptions tab will be ignored.
Off (not recommended)
Avoid using this setting. Turning off Windows Firewall may make this computer more vulnerable to viruses and intruders.
What else should I know about Windows Firewall?
OK
Cancel

Figure 14: Windows Firewall - General

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- **Setting Firewall Exceptions**

Select the **[Exceptions]** tab on the **[Windows Firewall]** screen. The **[Windows Firewall Exception Program List**] menu, see **Figure 17**, is shown. If **QAInitialize** and **QAEngineService** have already been added to the Exception Program List, the following procedure is unnecessary. If it has not yet been added, click **[Add a Program]**.

The **[Add a Program]** menu, see **Figure 15**, is displayed. Click **[Browse]**.
The **[Browse]** menu, see **Figure 16**, is displayed. Select the following applications in the installation folder and click **[Open].**Set for every applications.

- **[Installation Folder]\QAInitialize.exe** (initialization of application)
- **[Installation Folder]\ QAEngineService.exe** (Service)

The screen returns to the **[Windows Firewall Exception Program List]** screen, see **Figure 17**. Verify that the tick box for **QAInitialize** and **QAEngineService**, which now has been added to the Exception List, are checked, and click **[OK]**.

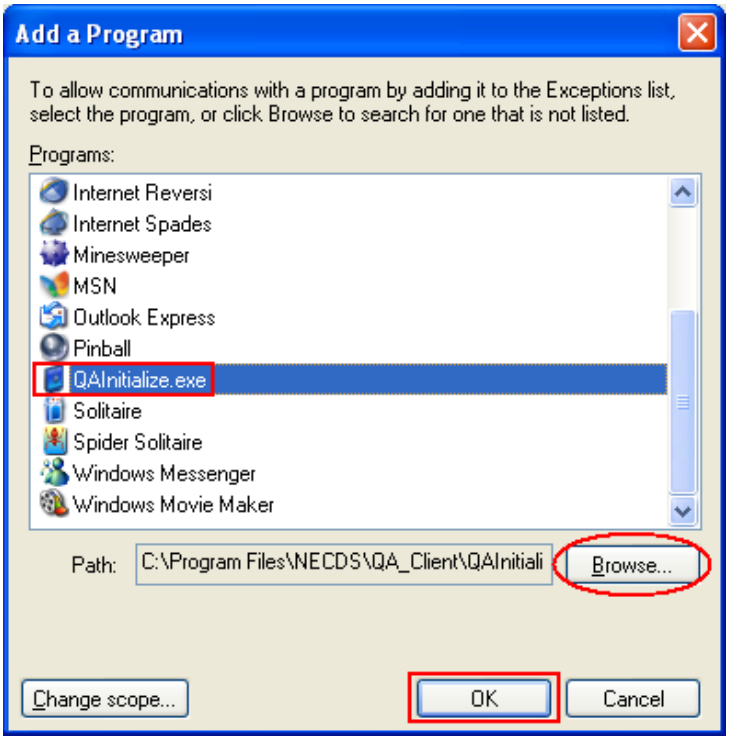

Figure 15: Add a Program

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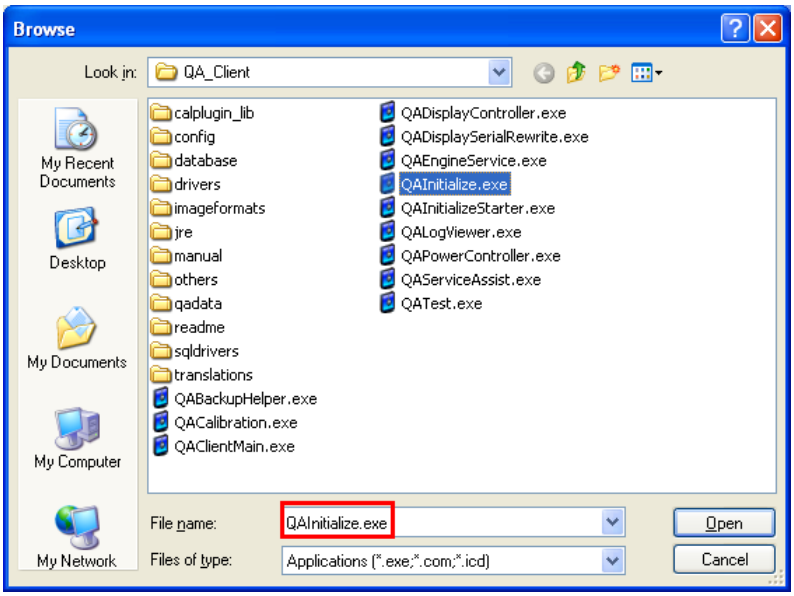

Figure 16: Browse programs to add

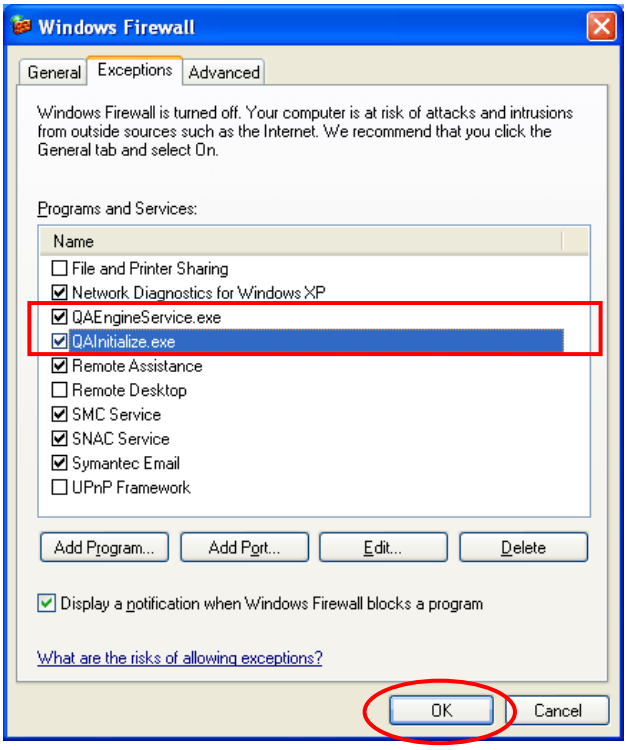

Figure 17: Windows Firewall - Exceptions program list

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- **Setting Firewall Advanced**

Select the **[Advanced]** tab on the **[Windows Firewall]** screen. The **[Windows Firewall – Advanced**], see **Figure 18**, is shown. Choose from a **[Network Connection Settings]** list the connection used for communication with a server, and click a **[Settings…]** button.

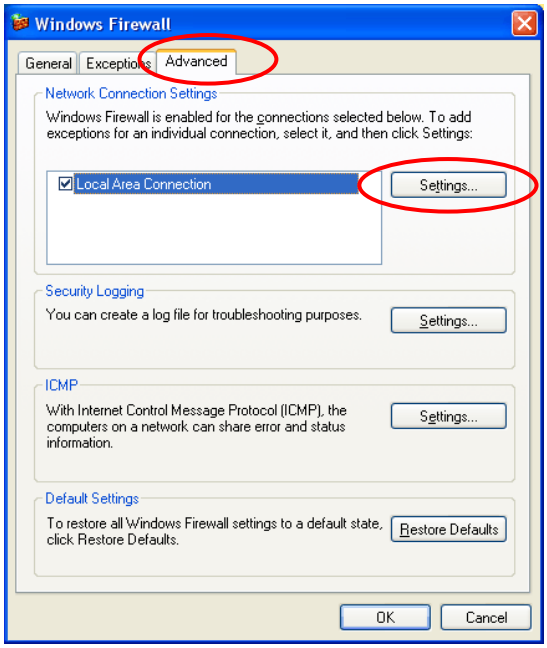
Windows Firewall
General
Exceptions
Advanced
Network Connection Settings
Windows Firewall is enabled for the connections selected below. To add exceptions for an individual connection, select it, and then click Settings:
Local Area Connection
Settings...
Security Logging
You can create a log file for troubleshooting purposes.
Settings...
ICMP
With Internet Control Message Protocol (ICMP), the computers on a network can share error and status information.
Settings...
Default Settings
To restore all Windows Firewall settings to a default state, click Restore Defaults.
Restore Defaults
OK
Cancel

Figure 18 Windows Firewall – Advanced

Select the **[ICMP]** tab on the **[Advanced Settings]** screen, see **Figure 19**, is shown. Select tick box **[Allow incoming echo request**], and click a **[OK]** button.

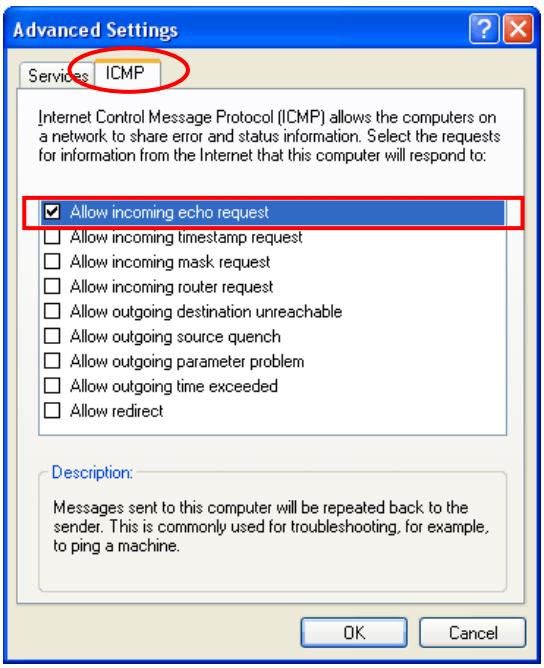
Advanced Settings
Services
ICMP
Internet Control Message Protocol (ICMP) allows the computers on a network to share error and status information. Select the requests for information from the Internet that this computer will respond to:
Allow incoming echo request
Allow incoming timestamp request
Allow incoming mask request
Allow incoming router request
Allow outgoing destination unreachable
Allow outgoing source quench
Allow outgoing parameter problem
Allow outgoing time exceeded
Allow redirect
Description:
Messages sent to this computer will be repeated back to the sender. This is commonly used for troubleshooting, for example, to ping a machine.
OK
Cancel

Figure 19 Windows Firewall - Advanced – Advanced Settings

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4.2. Windows 7 and Windows 8 / 8.1

- **Opening the Windows Firewall**

Click on **[Start]** in the taskbar, and select **[Control Panel]**.(Windows 7)

The **[windows key]** and the **[X key]** are pressed simultaneously, and select **[Control Panel].**(Windows 8 / 8.1)

Click on **[System and Security]** → **[Windows Firewall]**.

The **[Help protect your computer with Windows Firewall]** menu**,** see **Figure 20,** will appear.

Control Panel ▸ All Control Panel Items ▸ Windows Firewall
Search Control Panel
Control Panel Home
Allow a program or feature through Windows Firewall
Change notification settings
Turn Windows Firewall on or off
Restore defaults
Advanced settings
Troubleshoot my network
See also
Action Center
Network and Sharing Center
Help protect your computer with Windows Firewall
Windows Firewall can help prevent hackers or malicious software from gaining access to your computer through the Internet or a network.
How does a firewall help protect my computer?
What are network locations?
Home or work (private) networks
Connected
Networks at home or work where you know and trust the people and devices on the network
Windows Firewall state:
On
Incoming connections:
Block all connections to programs that are not on the list of allowed programs
Active home or work (private) networks:
Network 5
Notification state:
Notify me when Windows Firewall blocks a new program
Public networks
Not Connected

Figure 20: Help protect your computer with Windows Firewall

- **Enabling the Firewall**

Click **[Turn Windows Firewall on or off]** on the left side of this menu, see **Figure 20**. The **[Customize settings for each type of network]** menu, see **Figure 21,** will now be shown.

Select **[Turn on Windows Firewall]** and uncheck **[Block all incoming connections, including those in the list of allowed programs].** Repeat this action in the **[Public network location settings]** area.

Click on the **[OK]** button to return to **the [Help protect your computer with Windows Firewall]** menu**,** see **Figure 20**.

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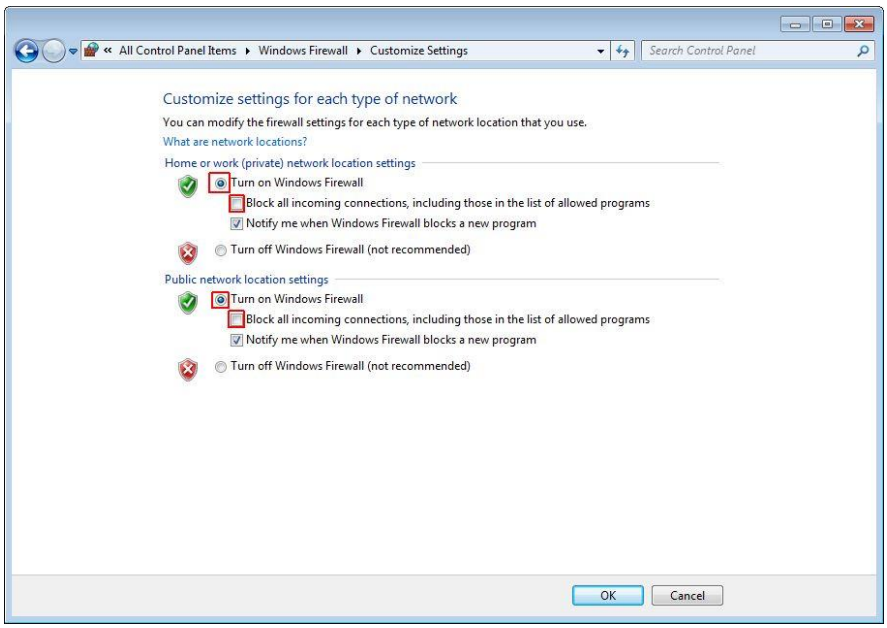
All Control Panel Items ▸ Windows Firewall ▸ Customize Settings
Search Control Panel
Customize settings for each type of network
You can modify the firewall settings for each type of network location that you use.
What are network locations?
Home or work (private) network location settings
Turn on Windows Firewall
Block all incoming connections, including those in the list of allowed programs
Notify me when Windows Firewall blocks a new program
Turn off Windows Firewall (not recommended)
Public network location settings
Turn on Windows Firewall
Block all incoming connections, including those in the list of allowed programs
Notify me when Windows Firewall blocks a new program
Turn off Windows Firewall (not recommended)
OK
Cancel

Figure 21: Customize settings for each type of network

- **Setting Firewall Exceptions**

Click on **[Allow a program or feature through Windows Firewall]** on the left side of this menu, see **Figure 20**. The **[Allowed programs to communicate through Windows Firewall]** menu, see **Figure 24**, is displayed. If **QAInitialize** and **QAEngineService** are already added, the procedures below are unnecessary. If it is not added, click on **[Allow another program…]**. The **[Add a Program]** menu, see **Figure 22**, is displayed. Click on **[Browse...]**.

The **[Browse]** menu, see **Figure 23**, is displayed. Select the following applications in the Installation Folder, and then click **[Open]**. Set for every applications.

- **[Installation Folder]\QAInitialize.exe (**initialization of application**).**
- **[Installation Folder]\ QAEngineService.*exe*** (Service)

The screen returns to **Figure 22.** Click on **QAInitialize** with the mouse (select it) and then click **[Add]**.

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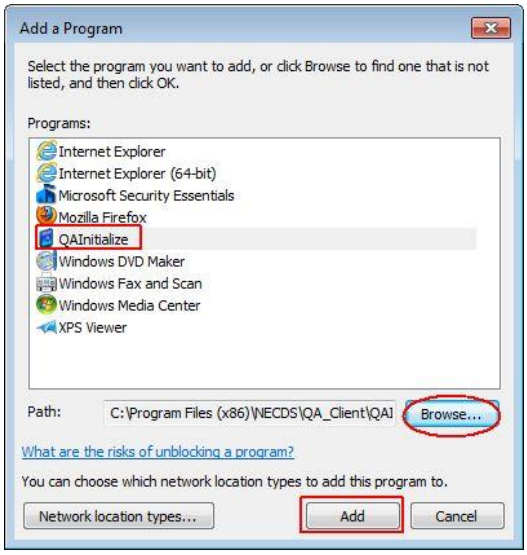

Figure 22: Add a Program menu

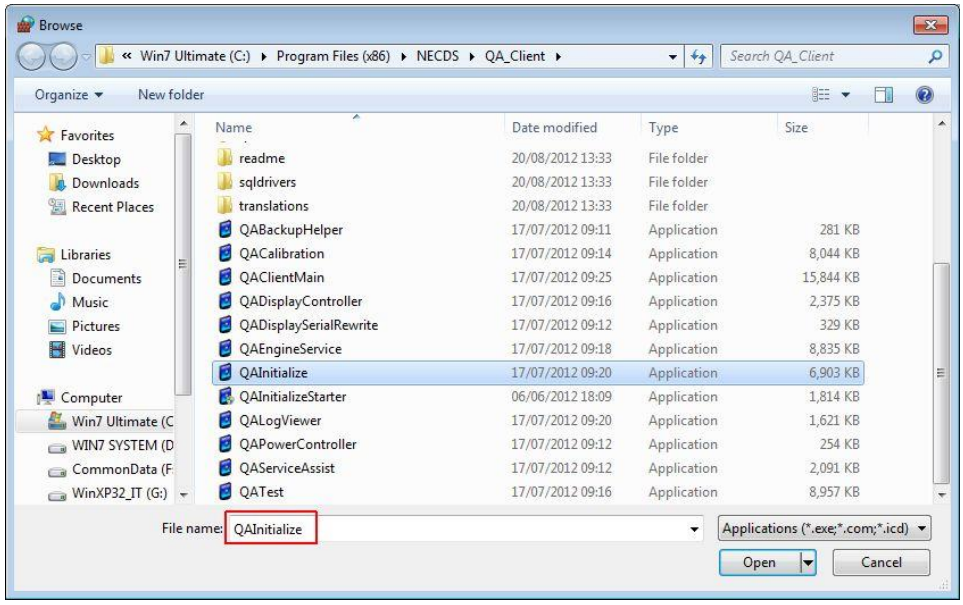

Figure 23: Select (Browse) programs to add screen

The Menu, as shown in **Figure 24**, allows programs to communicate through the Windows Firewall. Verify that the **QAInitialize** and **QAEngineService** are checked.

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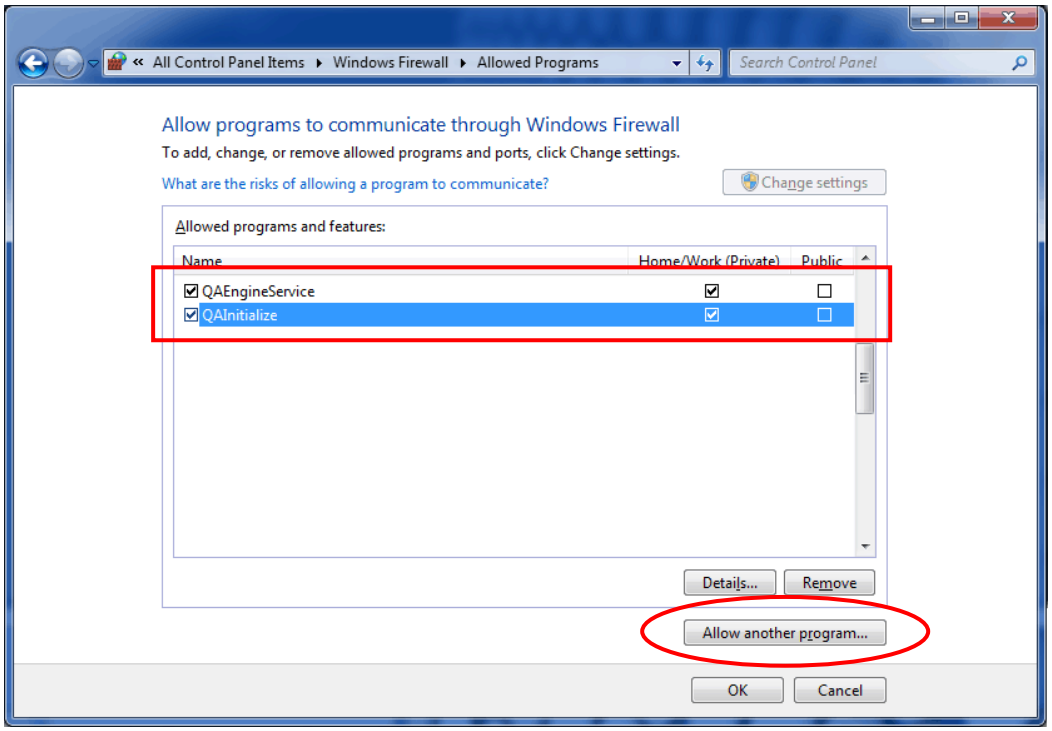

Figure 24: Allow programs to communicate through Windows Firewall Screen

- **Inbound Rules of the Firewall**

Click **[Advanced Setting]** on the left side of the **[Help protect your computer with Windows Firewall]** menu**,** see **Figure 20**.

The **[Windows Firewall with Advanced Security]** menu, see **Figure 25,** will now be shown.

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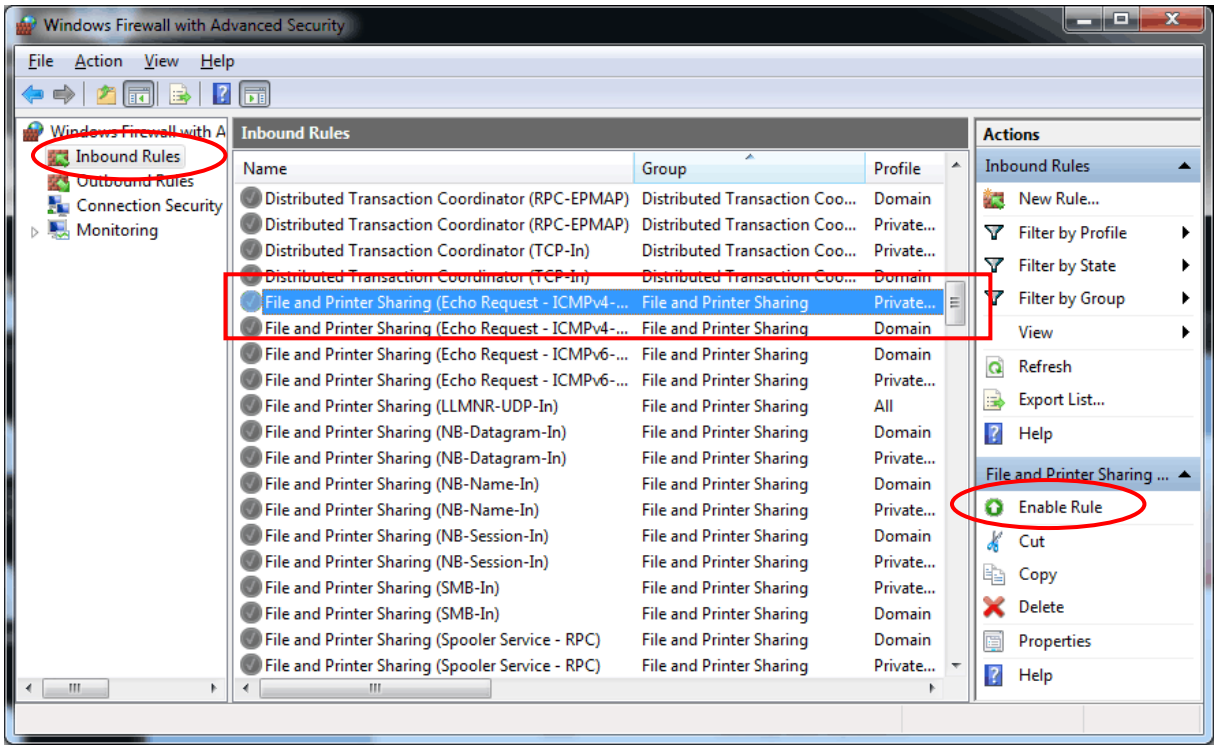
Windows Firewall with Advanced Security
File Action View Help
Windows Firewall with A
Inbound Rules
Outbound Rules
Connection Security
Monitoring
Inbound Rules
Name
Group
Profile
Distributed Transaction Coordinator (RPC-EPMAP) Distributed Transaction Coo... Domain
Distributed Transaction Coordinator (RPC-EPMAP) Distributed Transaction Coo... Private...
Distributed Transaction Coordinator (TCP-In) Distributed Transaction Coo... Private...
File and Printer Sharing (Echo Request - ICMPv4-... File and Printer Sharing Private...
File and Printer Sharing (Echo Request - ICMPv4-... File and Printer Sharing Domain
File and Printer Sharing (Echo Request - ICMPv6-... File and Printer Sharing Domain
File and Printer Sharing (Echo Request - ICMPv6-... File and Printer Sharing Private...
File and Printer Sharing (LLMNR-UDP-In) File and Printer Sharing All
File and Printer Sharing (NB-Datagram-In) File and Printer Sharing Domain
File and Printer Sharing (NB-Datagram-In) File and Printer Sharing Private...
File and Printer Sharing (NB-Name-In) File and Printer Sharing Domain
File and Printer Sharing (NB-Name-In) File and Printer Sharing Private...
File and Printer Sharing (NB-Session-In) File and Printer Sharing Domain
File and Printer Sharing (NB-Session-In) File and Printer Sharing Private...
File and Printer Sharing (SMB-In) File and Printer Sharing Private...
File and Printer Sharing (SMB-In) File and Printer Sharing Domain
File and Printer Sharing (Spooler Service - RPC) File and Printer Sharing Domain
File and Printer Sharing (Spooler Service - RPC) File and Printer Sharing Private...
Actions
Inbound Rules
New Rule...
Filter by Profile
Filter by State
Filter by Group
View
Refresh
Export List...
Help
File and Printer Sharing ...
Enable Rule
Cut
Copy
Delete
Properties
Help

Figure 25 Windows Firewall with Advanced Security

Select **[Inbound Rules]** from the tree on the left, and select **[File and Printer Sharing (Echo Request - ICMPv4-In)]** and **[File and Printer Sharing (Echo Request – ICMPv6-In)]** in the center pane. Two or more **[File and Printer Sharing (Echo Request - ICMPv4-In)]** and **[File and Printer Sharing (Echo Request – ICMPv6-In)]** are listed, please see the "**Profile**" column of the "**Inbound Rules**" and choose a profile (**Public, Private,** or **Domain**) suitable for network composition.

Then please click **[Enable Rule]** in the right column. If the **[File and Printer Sharing (Echo Request - ICMPv4-In)]** and **[File and Printer Sharing (Echo Request – ICMPv6-In)]** icons have changed to green, the operation is complete.

NOTE: Be sure to adjust security settings when behind a software firewall.

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5. First Start

5.1. Start-up and shutdown of GammaCompMD QA Client

If you selected **Create shortcut in Startup folder** during installation, GammaCompMD QA Client is started automatically when you start Windows. If you do not have created a shortcut on the Startup menu or the user have terminated GammaCompMD QA Client manually, please select **GammaCompMD QA Client** in the startup menu then active GammaCompMD QA Client manually.

All four methods actually place the **GammaCompMD QA Client** icon into the taskbar. With a mouse right-click on this icon, a Popup Menu is displayed, see **Figure 26.**

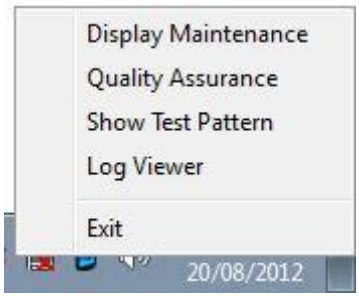

Figure 26: Popup Menu

The Popup Menu and **User Levels** are related to the user levels as follows:

Display Maintenance = Advanced Mode	(Expert level)
Quality Assurance = Technician Mode	(Standard level)
Show Test Pattern = Radiologist Mode	(Visual test level)
Log Viewer	

If you double click on the **GammaCompMD QA Client** icon, you can perform one of the three (**Display Maintenance**, **Quality Assurance** or **Show Test Pattern**) directly.

NOTE: If you see a communication failure message during the start of the **Display Maintenance** menu, it is likely due to a change in the Display configuration that was made between the GammaCompMD QA installation and first start of the application. GammaCompMD QA retrieves the display configuration from the Windows registry, therefore may not identify the displays correctly anymore. The following actions may solve the issue:

- Rebooting the system will read in the latest display configuration, which is then used by GammaCompMD QA.
- If this does not help, re-install GammaCompMD QA.

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5.2. User Password Setup

As shown in **User levels**, **GammaCompMD QA Client** provides the following three user levels:

- **Advanced Mode** **Display Maintenance** (Expert level)
- **Technician Mode** **Quality Assurance** (Standard level)
- **Radiologist Mode** **Show Test Patterns** (Visual test level)

The functionality is different for each level. *By default*, all users can execute operations at all levels from Advanced to Radiologist without a password, as no passwords are initially set.
To place restrictions on features that can be used in **Technician** and **Radiologist** level, an **Advanced Mode** user must set passwords within **5.2 User Password Setup** (page 45).

Level	Description
Advanced Mode (Expert level)	Assumes a user who is typically a PACS system administrator or third party Service Provider. All features of **Display Maintenance** are available. Since the user at this level can set password and/or access rights for the **Technician Mode** level, this level may also be able to execute all **Display Maintenance** functions. The **Advanced Mode** user should have local system administrator rights, to be able to restart system services and set backup schedules.
Technician Mode (Standard level)	Assumes a user who is typically a Medical Physicist or Biomedical Engineer who does not make any adjustments to the displays. Depending on the password setting, only Quality Assurance may be executed. The available features are limited to the items as specified with **7.7.2.1 Access Rights Setup for Quality Assurance** (page 127). (Note: The **Access Rights Setup for Quality Assurance** can only be modified by an **Advanced Mode** user.)
Radiologist Mode (Visual test level)	Assumes a user who performs visual tests. Typically this is a Radiologist or a Radiographer. Depending on the password setting, only viewing of test patterns may be executed.

For the **Advanced Mode** (Expert level), it is recommended to set up a password to operate **GammaCompMD QA Client** in a secure way. For further information about setting passwords, refer to **7.7.2.2 User Password Setup** (page 131).

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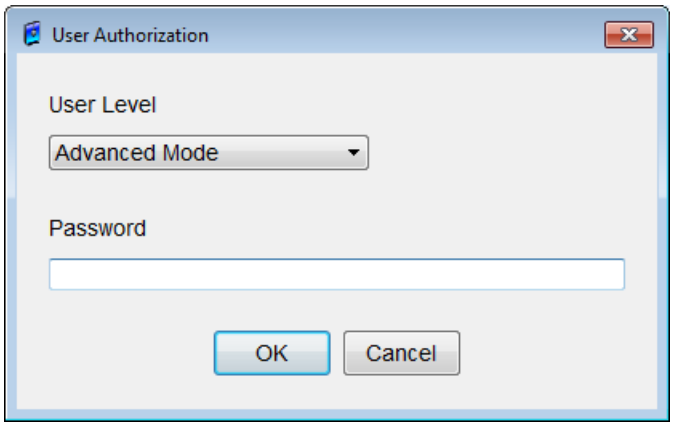

Figure 27: User authentication dialog

5.3. Changing the Display Configuration

If the screen orientation, resolution, logical display position, the number of connected displays or PIP MODE has changed, the **Reinitialize Display Configuration** is required. See **7.7.1.1 Re-initialization of Display Configuration** (page 105) for the re-initialization procedure.

5.4. Changing the Sensor

When clicking on **Auto-Detect**, the sensor connection is recognized. Also, a display sensor or external sensor can be selected from the **Preferred Sensor Selection** listbox. This function is only active for either a display with a front sensor or a display for which a retractable sensor has been set up.

5.5. Change of Installation Location or Ambient Light Environment

If the location or indoor lighting environment has changed, please complete an **Ambient Light Measurement**. Ambient light measurements may either be performed manually with a professional illuminance meter or as described in **Ambient Light Measurement (**page 68**).** Then execute the QA test as described in **7.4.1 QA Test Start** (page 90).

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6. Main Display

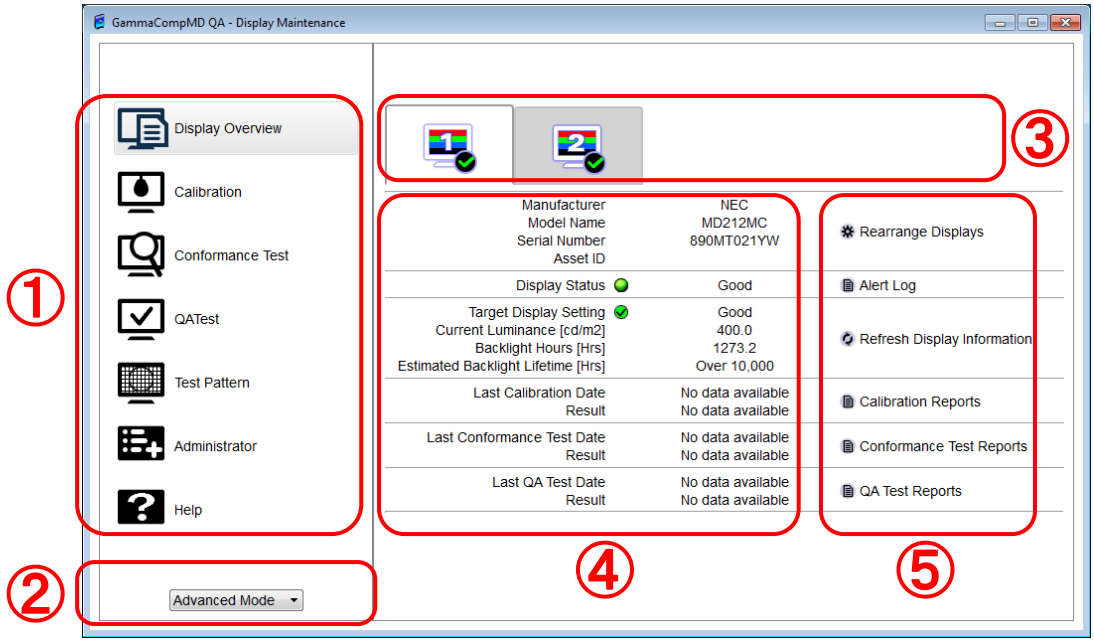

Figure 28 : Main Display and each Information Area

① Main Menu Area

The contents of **④Display Information Area** and **⑤Sub Menu** will change by selecting each item of the main menu.

② User Level Area

The current User Level is shown. The User Level will change by selecting a User Level in the listbox. You will be prompted to enter the password if a User Password has been set for this level.

③ Display Icon Area

Various types of available display icons are shown below:

Icon	Description
	A color display is being used in landscape mode
	A color display is being used in portrait mode

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	A grayscale display is being used in landscape mode
	A grayscale display is being used in portrait mode
	A large screen display (example: Multeos) is being used in landscape mode
	A large screen display (example: Multeos) is being used in portrait mode
	A navigation display (a display that is not subject to any action) is being used in landscape mode
	A navigation display (a display that is not subject to any action) is being used in portrait mode
	The display is recognized correctly.
	If any errors are detected on the connected display. ・The display has not been recognized correctly. ・An error occurred in the connected display during QA test or calibration. ・A display has been detected, which is different from the original display since the last re-initialization of display configuration.

④ Display Information Area

Shows information according to the selected item in the main menu.

⑤ Sub Menu Area

The sub menu is shown according to the selected item in the main menu. Perform specific functions by selecting an item in this sub menu.

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7. GammaCompMD QA Main Menu Structure

Main Menu	Sub Menu	
Display Overview	Rearrange Displays	
	Alert Log	
	Refreshing Display Information	
	Calibration Reports	
	Conformance Test Reports	
	QA Test Reports	
Calibration	Rearrange Displays	
	Calibration Reports	
	Schedule Setup	
	Calibration Setup	
	Sensor Setup	
Conformance Tests	Rearrange Displays	
	Conformance Test Reports	
	Schedule Setup	
	Sensor Setup	
QA Test	Rearrange Displays	
	QA Test Reports	
	QA Test Setup	
Test Pattern	Rearrange Displays	
	Test Pattern Setup	
Administrator	System Setup	Re-initialization of Display Configuration
		Reinitialize System Configuration
		Language Setup
		Asset ID Setup (Optional)
		Alert Setup
		Network Execution Setup
		Backup Schedule Setup
	User Setup	Access Rights Setup for Quality Assurance
		User Password Setup
		Startup User Level
	Extra Features	White Luminance Measurement
		Black Luminance Measurement

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		Uniformity Test
		Display Matching
		Create Modification Log Entry
		Display Control Button Lock
	Special Reports	White and Black Luminance Measurement Reports
		Uniformity Test Reports
		Latest Results List
		Display Information
		System Information
Help	—	

7.1. Display Overview

Click **Display Overview** in the **Display Maintenance** screen to display **Figure 29**. The **Display Overview** screen is shown.

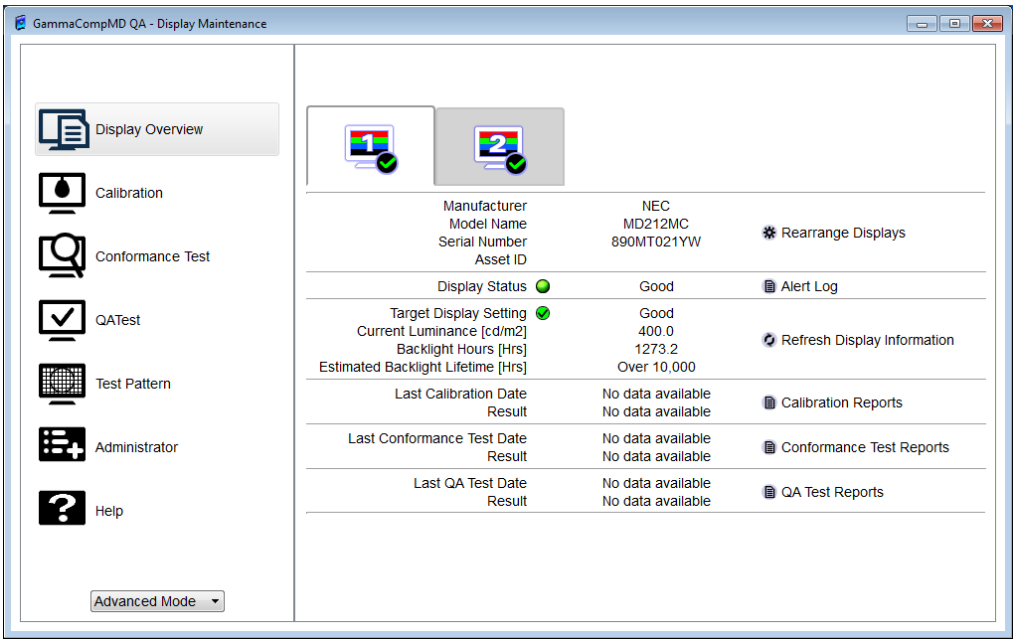

Figure 29: Display Overview screen

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7.1.1. Rearrange Displays

Click **Rearrange Display** in **Display Overview** to display the **Rearrange Display** dialog box.

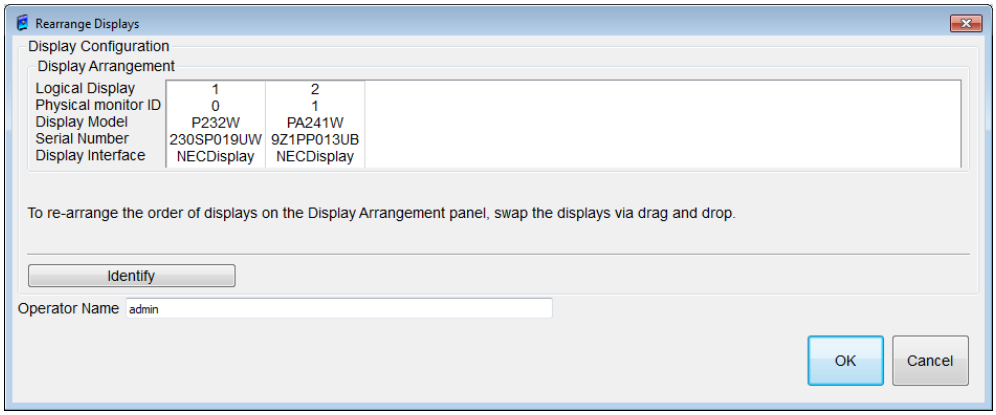

Figure 30: Rearrange Display dialog box

- **Display Arrangement**

You can rearrange a display by dragging and dropping with the mouse (always from left to right) in the **Display Arrangement.** Please use this function to rearrange the information that is displayed in the display information area.

- **Identify**

Click the **Identify** button to show the **Logical Display** Number on each display.

- **OK button**

Changes will be saved and the dialog box will close. The **OK** button cannot be clicked if no Operator Name is entered.

- **Cancel button**

Closes the dialog box without applying any settings.

7.1.2. Alert Log

The selected display status (occurrence of errors and warnings for each test) is displayed by the icon in the middle of the screen of display information area.

If flashing red or yellow icons are displayed, click the **Alert Log** in the sub menu to display the Log Viewer **10 Log Viewer** (page 153), then check the details of the alert.

Icon	Description
(Flashing Red)	One of the following errors or alerts did occur: ● Display Communication Error ● Temperature Alert ● Backlight Time Alert

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	• Backlight Brightness Alert See **7.7.1.5 Alert Setup** (page 116) for a description of the error or alert.
 (Flashing Orange)	One of the following errors did occur: • White Luminance Test Error • LUM Test Error • FIT Test Error • GSDF Error • QA Test Error See **7.7.1.5 Alert Setup** (page 116) for a description of the error.
 (Green)	Normal status without any alerts.
 (Gray)	The display is not enabled in Windows, or the interface mode is set to **NAVDisplay**. See **7.7.1.1 Re-initialization of Display** Configuration (page 105) for setting the display configuration.

NOTE: The occurrence of an error or alert is shown in the display status area, regardless of whether checkboxes in 7.7.1.5 Alert Setup (page 116) **are checked or not.**

7.1.3. Refreshing Display Information

The display status will be indicated by an icon in the middle of each screen in the display information area. When “x” or “?” is displayed, you must reinitialize the display configuration. See **7.7.1.1 Re-initialization of Display Configuration** (page 105).

Icon	Description
	The display cannot be detected.
	Power of connected display is not turned on or settings have been changed in the meantime.
	Display is recognized correctly.

7.1.4. Calibration Reports

Click **Calibration Reports** in **Display Overview** to show results of calibrations which were performed in the past. See **7.2.3 Calibration Reports** (page 56).

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7.1.5. Conformance Test Reports

Click **Conformance Test Reports** in **Display Overview** to show results of conformance tests which were performed in the past. See **7.3.3 Conformance Test Reports** (page 85).

7.1.6. QA Test Reports

Click **QA Test Reports** in **Display Overview** to show results of QA tests which were performed in the past. See **7.4.3 QA Test Reports** (page 95).

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7.2. Calibration

Click **Calibration** in the **Display Maintenance** screen to display **Figure 31**. The **Calibration** screen is shown.

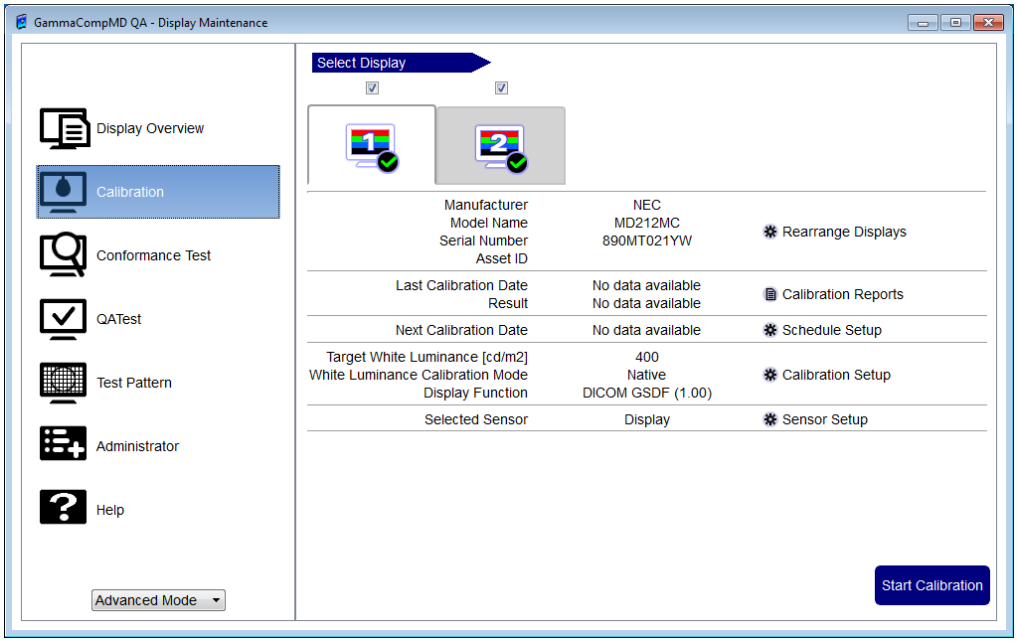

Figure 31: Calibration screen

7.2.1. Perform a Calibration

Select the display to select the check box at the top of the display icons (Multiple displays can be selected.). And then click **Start Calibration** at the bottom right of this screen, the calibration will start for the selected display(s). Please follow the instructions on the screen. If both display sensors and external sensors have been set for various displays, calibration will start with those displays for which display sensors are set and then will continue with displays for which external sensors are set.

Calibration is executed simultaneously with multiple display sensors, except with MD212G3, MD215MG, MD211G5 and MD302C6 models, where the calibration is done sequentially. Using external sensors, the calibration executed in ascending order of display numbers.

The calibration process includes:

- **White Luminance Calibration**
- **Grayscale Calibration**
- **Conformance Tests**

The calibration status is displayed on each target display, as shown in **Figure 32**. When the "Overall Progress" bar reaches 100%, the calibration will be complete. A running calibration may be interrupted by the Cancel button at any time.

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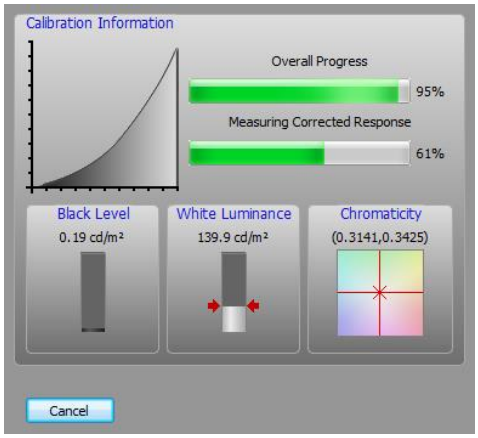

Figure 32: Status screen on target display calibration

Once a calibration is completed, a **Calibration Report** dialog box is shown on each target display, as shown in **Figure 33**. See **7.2.3 Calibration Reports** (page 56).

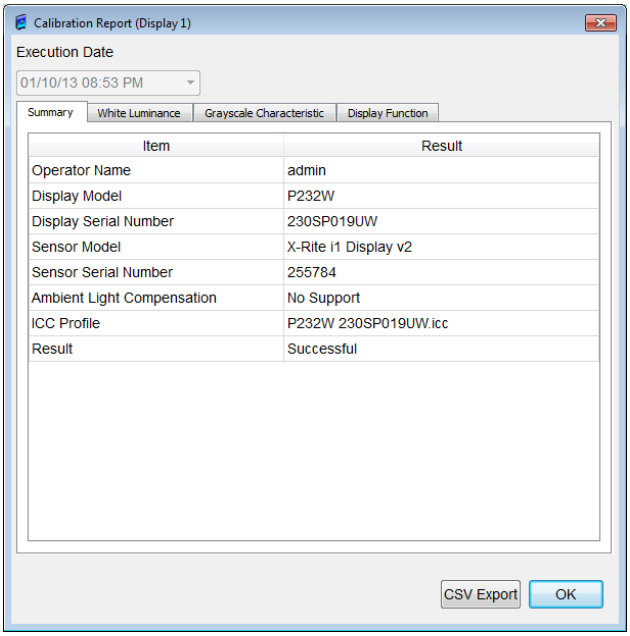

Figure 33: Calibration Report dialog box

NOTE:

- When the target curve **Native** was selected, a grayscale calibration will not be performed. Only the native luminance response curve of the display will be measured. In addition, calculation for the conformance test will be performed when “DICOM GSDF” or “L*” custom curve is selected. For more information about setting the target curve, refer to **7.2.5 Calibration Setup** (page 64).

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- A calibration may not be performed when using an external sensor without color support. Please refer to **Using sensor models without color measurement capability** in **7.2.6 Sensor Setup** (page 77). - **Additional considerations** for details.
- The PICTURE MODE in the ON-SCREEN-DISPLAY (OSD) of some display models will be changed from its factory preset mode to "GCMDQA" after a calibration. There are cases that this factory preset status will not be overwritten. However this will not influence the actual calibration.
- A Black Luminance Measurement may fail due to poor condition of an external sensor (i.e. due to aging). Please try a different sensor unit. A failed display sensor may be readjusted using **Reference Calibration** (page 75), by using a good external sensor.

7.2.2. Rearrange Displays

Click **Rearrange Displays** in **Calibration** to rearrange display. See **7.1.1 Rearrange Displays** (page 51).

7.2.3. Calibration Reports

Click **Calibration Reports** in **Display Overview** to display the **Calibration Reports Display Selection** dialog box, as shown in **Figure 34**.

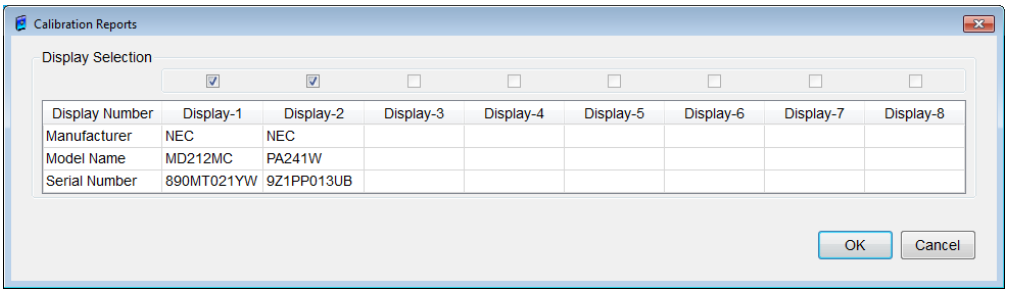

Figure 34: Calibration Reports Display Selection dialog box

The **Summary** tab will be displayed when the **OK** button is clicked. Click the **White Luminance** (**Figure 36**), **Grayscale** (**Figure 37**) or **Display Function** (**Figure 38**) tabs to display the corresponding dialog boxes. The **OK** button cannot be clicked if no display is selected.

- **Common settings for each tab**

Execution Date If the listbox under **Execution Date** is clicked, the latest report will be displayed at the top, with previous reports underneath in order of date and time. Click the date you wish to view and that day's measurement report will be displayed.

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CSV Export button	Shows **Save Report in CSV Format** dialog box. Reports can be saved as a CSV file.
OK button	Show the **Calibration Report** dialog box for the display selected, see **Figure 34**.

- **Summary(tab)**

Display the **Calibration Report: Summary** dialog box. The list contains the following items**:** Operator Name, Display Model, Display Serial Number, Sensor Model, Sensor Serial Number, ICC Profile and Result (Successful/Failed).

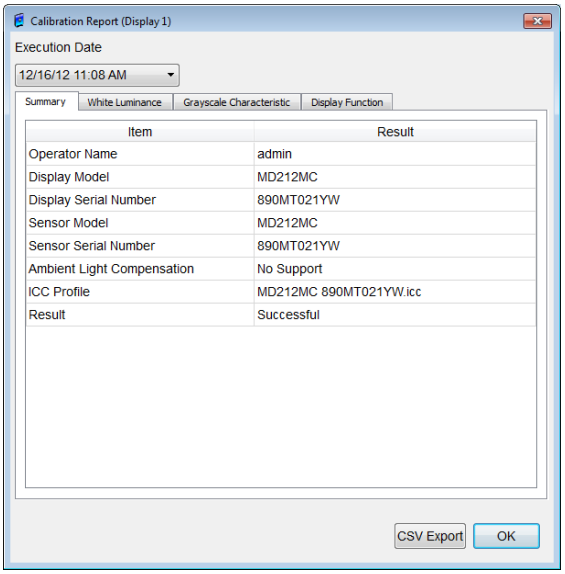

Figure 35: Calibration Report: Summary dialog box

- **White Luminance(tab)**

The list contains the following items**:** White Luminance Calibration Mode, Chromaticity Target x and y, Chromaticity Tolerance x and y, Chromaticity Actual x and y, Luminance Target (cd/m^2), Luminance Tolerance (cd/m^2) and Luminance Actual (cd/m^2).

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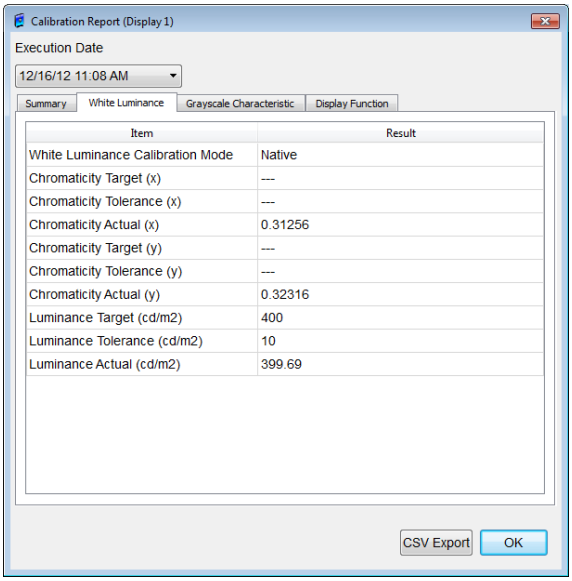

Figure 36: Calibration Report: White Luminance dialog box

- **Grayscale Characteristic (tab)**

The list contains the following items**:** Display Function, Number tab of Measurement Points, Maximum Luminance Actual (cd/m^2), Minimum Luminance Target (cd/m^2), Minimum Luminance Actual (cd/m^2), Maximum DDL Value, Number of LUT Entries and Maximum LUT Value.

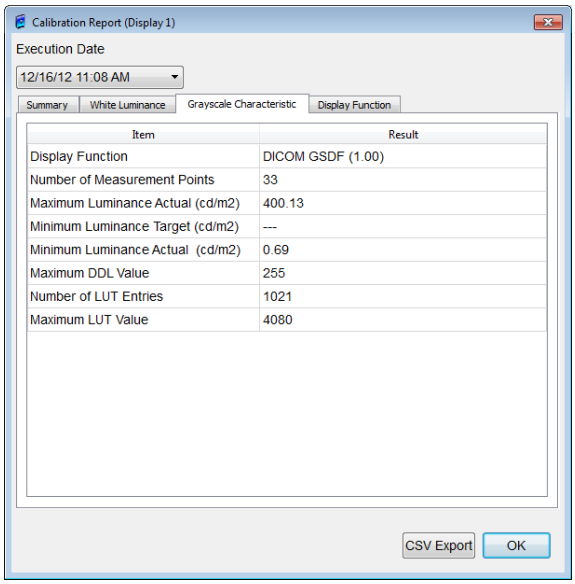

Figure 37: Calibration Report: Grayscale dialog box

- **Display Function(tab)**

Reports luminance characteristics measured in graph form. Gamma curves can be shown or hidden by checking or un-checking the boxes. The curve for a specific color can also be shown by selecting that color.

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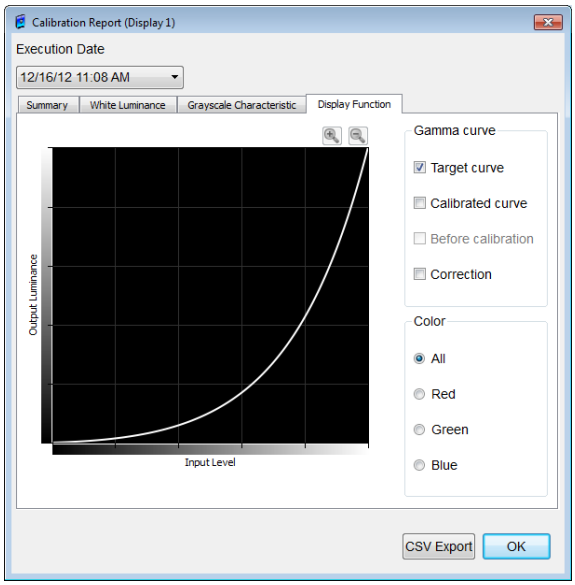

Figure 38: Calibration Report: Display Function dialog box

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7.2.4. Schedule Setup

Click on **Schedule Setup** in **Calibration** to display the **Schedule Setup** dialog box, see **Figure 39**.

NOTE: Scheduled action can use not only **Display Sensor** but also **External Sensor**.
Display Sensor will be used preferentially regardless of the Preferred Sensor Selection Settings. See **7.2.6 Sensor Setup** (page 77)
If the display has no **Display Sensor**, **External Sensor** will be used.

- The following **External Sensors** are available
  - MDSVSENSOR3 by NEC (USB)
  - i1 Display version 2 by X-Rite (GretagMacbeth) (USB)
  - i1Display Pro by X-Rite (USB)
  - Spyder3 by Colorvision (USB)
  - Unfors Luxi (RS-232C) - Color measurement not supported
  - IBA LXcan(USB) - Color measurement not supported
  - IBA LXchroma(USB)

Note for the displays which have no Display Sensor:

- When you use the **External Sensor**, put it on the center of the screen beforehand.
- When the **External Sensor** is in the ambient light measurement mode, the scheduled action will fail.
- Only one External Sensor is available.
- The following cases are not executed.
  - **External Sensor** is not put on the screen beforehand.
  - **External Sensor** is put on the screen of the display excluding for schedule action.
  - **External Sensor** is not connected.

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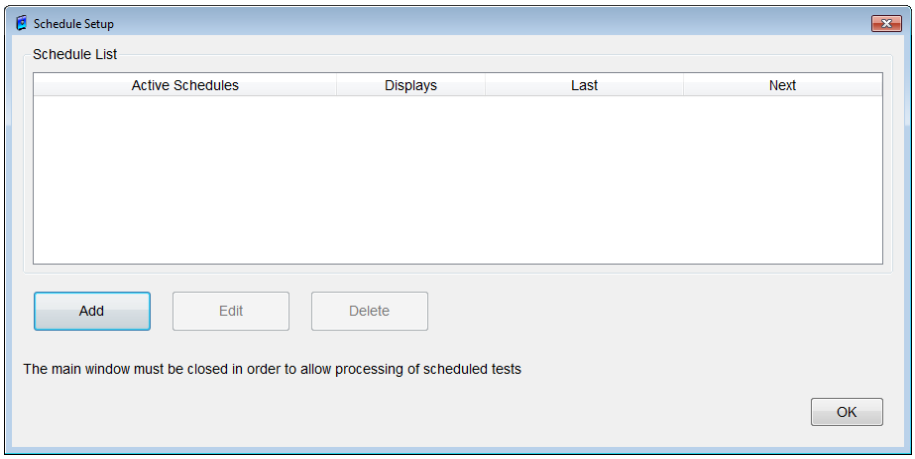

Figure 39: Schedule Setup dialog box

Schedule List (Time Table)

At initial state, this list is empty. After schedules have been defined, the first schedule will be displayed on top of the list, with next schedules underneath, in order of date and time.

Add button

Shows the Add new schedule dialog box **Figure 40** to add scheduled tasks as well as start date and interval.

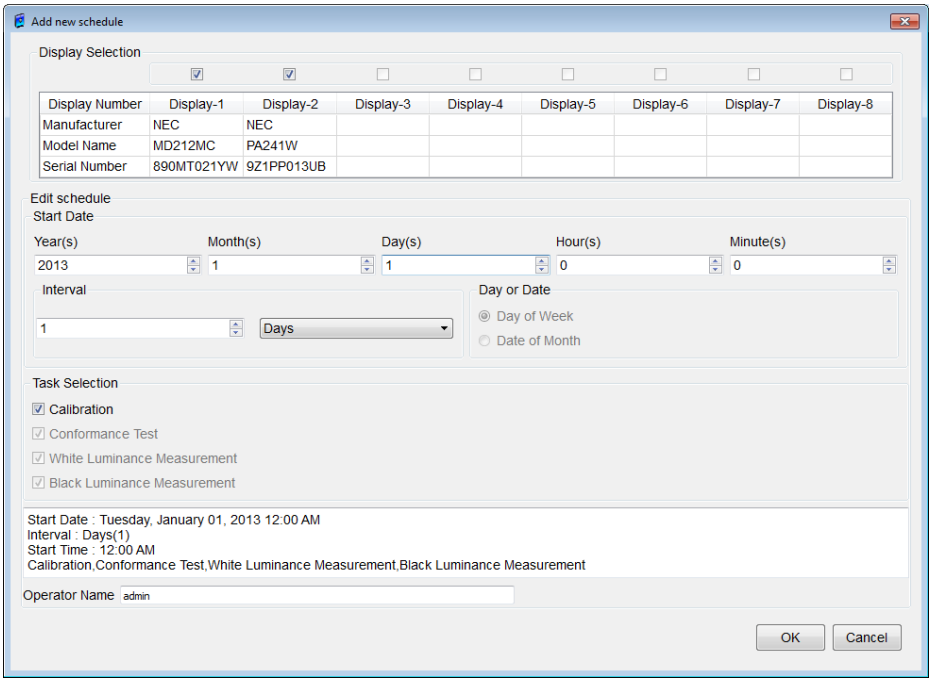

Figure 40: Add new schedule dialog box

- **Interval**

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Set the frequency with which the schedule will be executed (days, weeks, months, years). Enter a number from 1 to 1000. Example**:** If “6 months” is selected, the schedule will be executed on the schedule start date and then every 6 months after that.

- **Day or Date**

A preferred day of the week or month can be set for the next schedule execution date onwards. Date of Month cannot be used for daily or weekly settings.

- **Task Selection**

Check the boxes **Calibration**, **Conformance Test**, **White Luminance Measurement** and/or **Black Luminance Measurement**. The tasks will be executed in the following ranking: If the **Calibration** box is checked, all other boxes will automatically be checked. If the **Calibration** box is un-checked, **Conformance Test** and the other tasks will automatically stay checked. **White Luminance Measurement** and **Black Luminance Measurement** can be selected by un-checking both the **Calibration** and the **Conformance Test** boxes.

- **OK** button

Closes the dialog box and applies the schedule information set. Check that it has been added to the schedule list on **Figure 39: Schedule Setup** dialog box. The **OK** button cannot be clicked if no **Operator Name** is entered or if no display is selected.

- **Cancel** button

Closes the dialog box without applying any settings.

Edit Schedule Select the schedule that you want to edit, then click the Edit button. The Edit saved schedule dialog box **Figure 41** is shown. The content that is displayed in the dialog is a saved schedule.

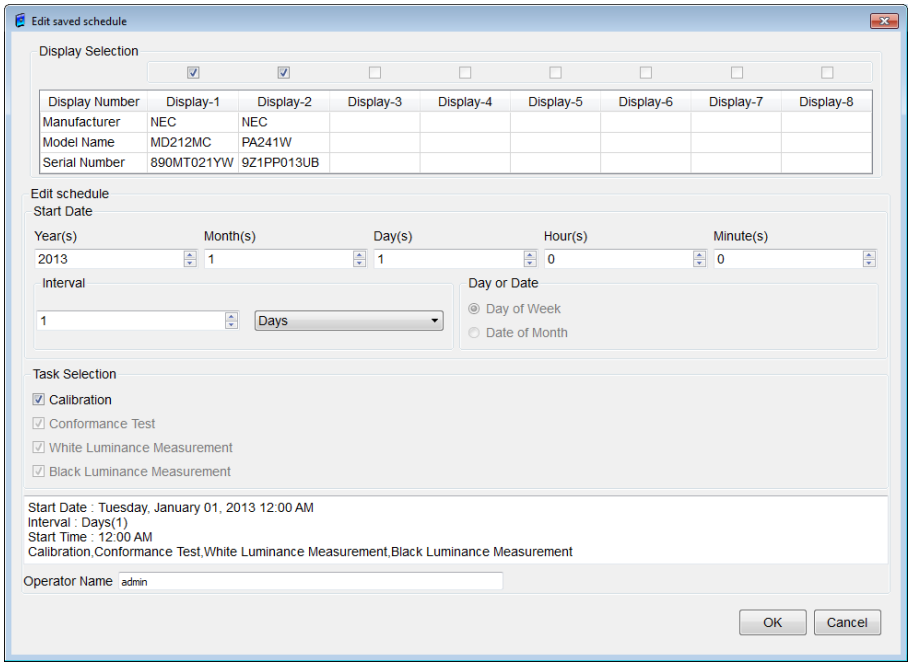

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Figure 41: Edit saved schedule dialog box

- **OK** button

Closes the dialog box and saves any changes to the schedule. Check the changes in the **Schedule Setup** dialog box on (**Figure 39**)**.**

- **Cancel** button

Closes the dialog box without applying any settings.

Delete button	Click on the schedule which you wish to delete. Then click the **Delete** button. Multiple schedules cannot be deleted at once.
OK button	Closes the Schedule Setup dialog box.

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7.2.5. Calibration Setup

When **Calibration Setup** is clicked within the **Calibration** main menu, the Calibration Setup dialog box, shown in **Figure 42**, is displayed. This dialog box is used to define parameters and various settings for each display which are used during the calibration. Since the actual calibration operation is executed sequentially, with **White luminance calibration** first, followed by **Grayscale calibration**, these settings are required before a calibration.

Click on **Calibration Setup** in **Calibration** to open the **White Luminance**. The other setup dialog boxes are shown by clicking on the other available tabs - **Grayscale Function** - **Minimum Black Level** - **Ambient Light Compensation** and **ICC Profile**.

- **Common settings for each tab**

Display Selection Displays are selected one at a time by clicking the radio buttons above the display numbers.

Restore Defaults Change values to the default values which are defined for the specific display model. All items within each dialog box for White Luminance, Grayscale and Black Level are reset to their initial values. Selection of using the Ambient Light Compensation, current illumination value and the reflected luminance value return to a value of which a **calibration setup** was opened. The value returns to value that is applied by clicking the **Apply** button.

Apply to same display models

When multiple displays with the same model name are connected, copy all defined parameters from one display to the other displays.

OK button Saves the calibration parameter settings to each display and closes the dialog box. The **OK** button cannot be clicked unless the **Operator Name** is entered.

Cancel button Cancels any settings and closes the dialog box. Any settings which were applied by clicking the **Apply** button cannot be returned to its previous state.

After the following buttons are clicked in **Ambient Light Compensation** tab(**Figure 51**), **Illumination** value and **Reflected**

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Luminance value do not return to an original value even if cancel button is clicked.

- **Manually adjust the Reflected Luminance value** button(**Figure 51**)
- **OK** button of **Reflected Luminance Setup**(**Figure 52**)
- **Retrieve both factory preset values from the displa**y button(**Figure 51**)
- **Measure and calculate** button(**Figure 51**)

Apply button — Applies the calibration parameter settings to each display but does not close the dialog box. The **Apply** button cannot be clicked unless the **Operator Name** is entered.

- **White Luminance tab**

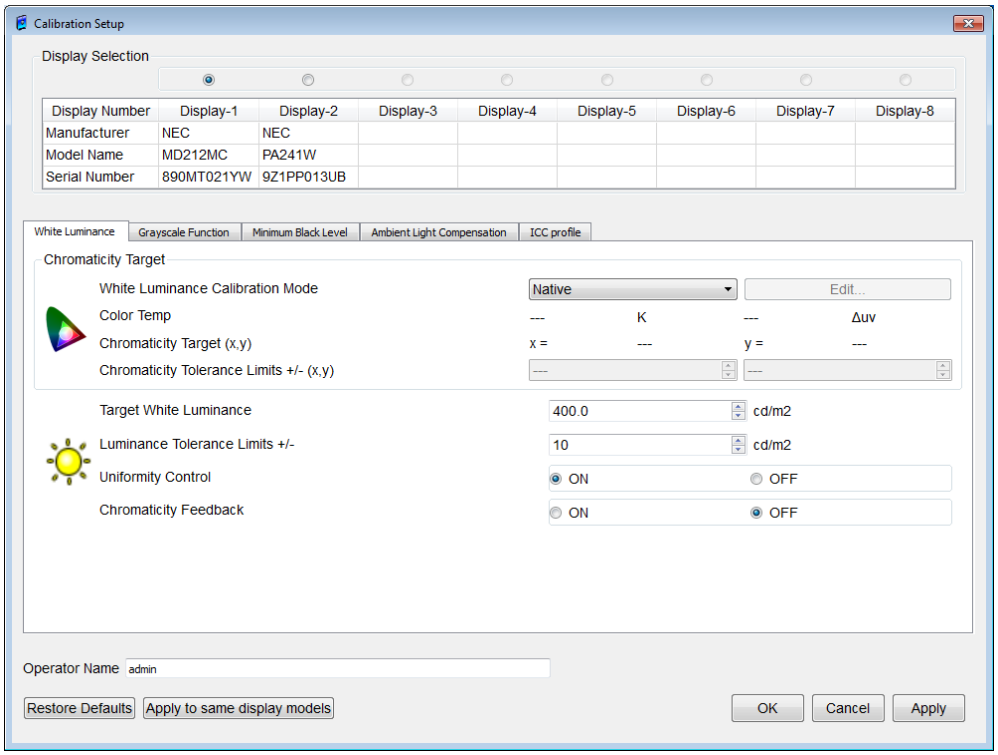

Figure 42: Calibration Setup – White Luminance dialog box

White Luminance Calibration mode

Select the mode for setting the calibration target from the listbox. Depending of type of display, not all modes will be selectable. For most color displays the calibration mode is selectable in a Listbox.

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Color Temp and Chromaticity Target (x,y)

Shows the target color temperature (K) and color chromaticity (x, y), when executing calibration. The optimum value is displayed according to the selected calibration mode and depend on the display model. If an individual color temperature or chromaticity target (x,y) setting is required, click the **Edit** button. The **Custom Chromaticity** dialog box, as shown in **Figure 43**, will be displayed.

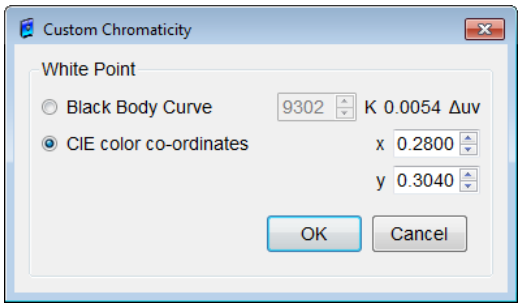

Figure 43: Custom Chromaticity dialog box

Chromaticity Tolerance Limits +/- (x,y)

Define the calibration chromaticity (x, y) tolerance limits. The default value and range that can be set depends on the display model. When **Native** or **No Change** is selected for the calibration mode, "- - -" is displayed for this item. **No Change** may not be selectable, depending on the connected display model.

Target White Luminance

Define the calibration target white luminance. The default value and range that can be selected depends on the display model.

Luminance Tolerance Limits +/- (x,y)

Define the calibration luminance tolerance limits. The default value and range that can be selected depends on the display model.

Uniformity Control

Switch the uniformity correction capability of the display between ON and OFF. This is applied immediately by clicking the **Apply** or **OK** button regardless of whether or not calibration is executed. This option is grayed out for display models which do not support this feature.

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Chromaticity Feedback

Enable or disable the chromaticity feedback feature, which runs independently after a calibration has finished. This option is grayed out for display models which do not support this feature.

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- **Grayscale Function**

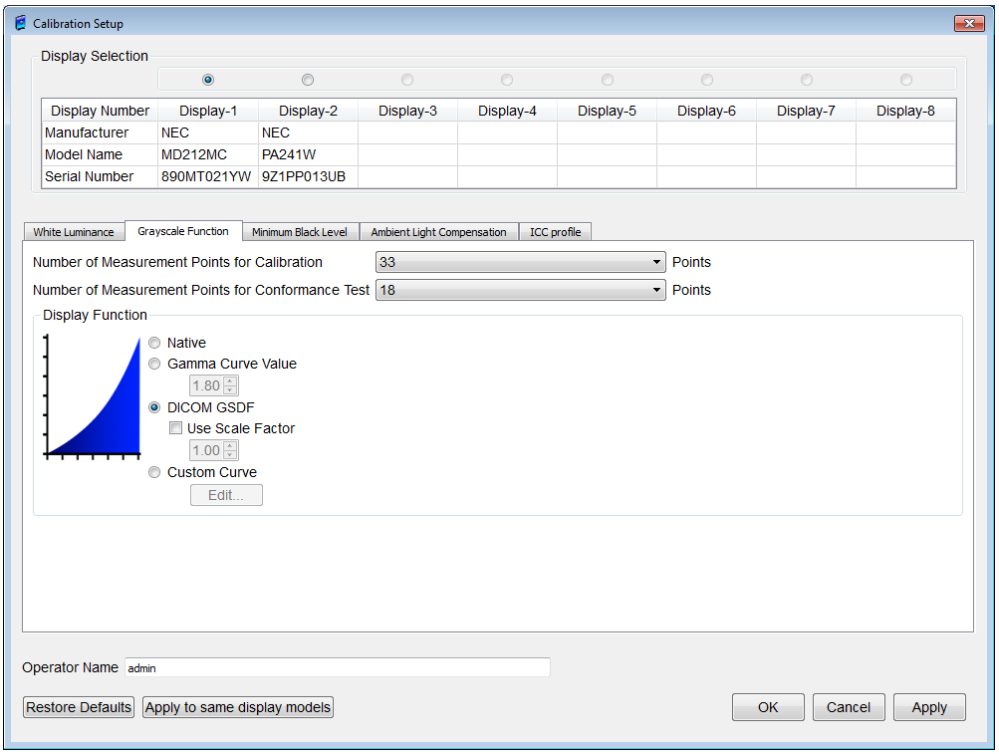

Figure 44: Calibration Setup – Grayscale dialog box

Number of Measurement Points for Calibration

Select the number of measurement points for measuring the luminance characteristics of the display during a grayscale calibration. When a **Display Sensor** was selected, the selected number of measurement points here is ignored.

NOTE: The number of measurement points may not be selectable, depending on display model.

Number of Measurement Points for Conformance Test

Select the number of measurement points for measuring the luminance characteristics of the display during a conformance test between 8, 18, 32, and 52 points. When a Display Sensor was selected, the selected number of measurement points here is ignored.

NOTE: The number of measurement points may not be selectable, depending on display model.

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Display Function The display function can be selected from the following four types

- **Native**

When Native is selected as the target curve, a grayscale calibration is not performed. The luminance characteristics of the display are only measured.

- **Gamma Curve Value**

Fixed Gamma correction values from 1.00 to 3.00 may be selected.

- **DICOM GSDF**

Default setting for DICOM Grayscale Standard Display Function calibration (DICOM Standard, Part 14). Values from 0.50 to 1.00 may set when the **Use Scale Factor** checkbox is checked.

- **Custom Curve**

When the **Edit** button is clicked, the Custom Gamma Curve dialog box, as shown in **Figure 45**, is displayed. This shows a graphical representation of the display's luminance characteristics.

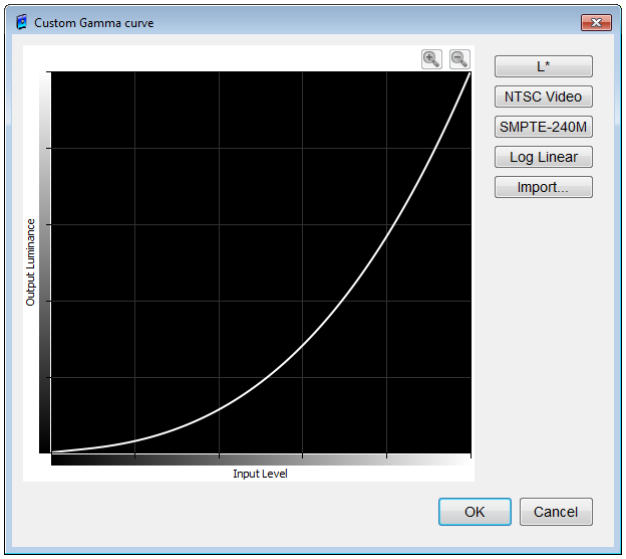

Figure 45: Custom Gamma Curve dialog box

➢ buttons

After dragging the mouse to specify a range on the graph in a rectangle, these buttons can be used to zoom in or out on the curve.

➢ **L* and Log Linear** buttons

Select pre-defined custom curves with these buttons.

Note: The **NTSC Video, SMPTE-240M** as well as the **Import** button are disabled for display model which do not support this feature.

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➢ **Import** button (mostly disabled)

When the **Import** button is clicked, the Import Custom Curve Points Text File dialog box, as shown in **Figure 46,** is displayed.

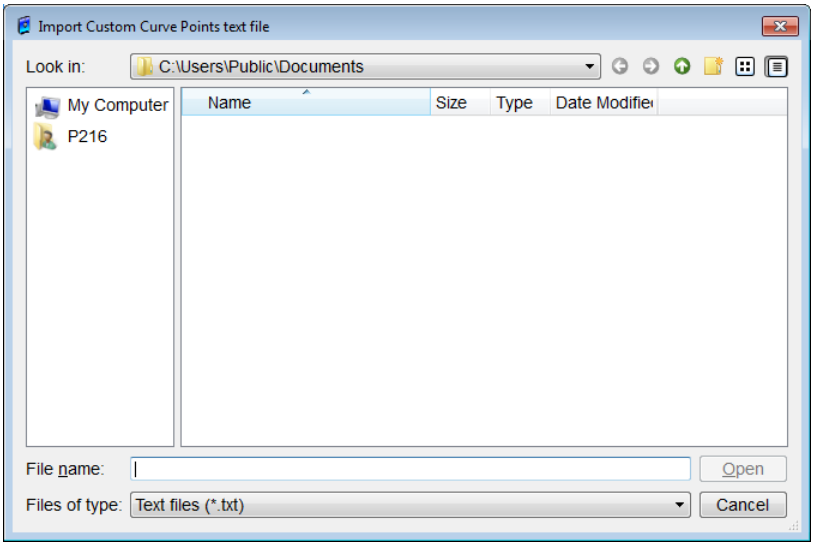

Figure 46: Import Custom Curve Points Text File dialog box

- **Minimum Black Level tab**

When the **Minimum Black Level** tab is clicked, the minimum black level setup dialog box, as shown in **Figure 47**, is displayed. When the checkbox is checked, the minimum black level can be set within a range from 0.00 to 4.99 cd/m2. This option is grayed out for display models which do not support this feature.

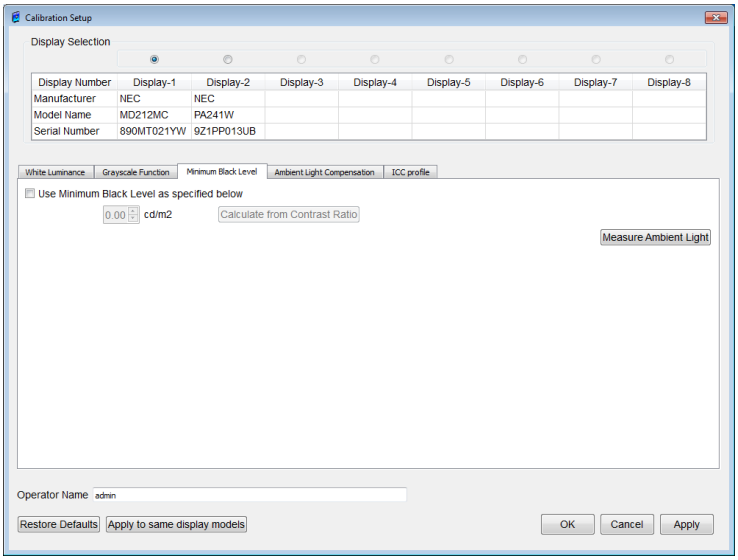

Figure 47: Calibration Setup – Minimum Black Level dialog box

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NOTE: This function is useful to lift the black level and make the dark portions of a typical DICOM image more visible against reflections of the ambient light on the LCD panel of a display. Due to this reason, regional/national obligations as well as recommendations from clinical studies may require raising the black level of diagnostic imaging displays.

Calculate from Contrast Ratio button

Displays the Custom Black Luminance Level dialog box, as shown in **Figure 48**.

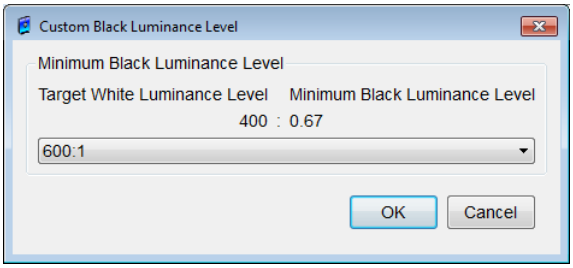

Figure 48: Custom Black Luminance Level selection

Measure Ambient Light button

If an external sensor is connected to the system, which is capable of measuring ambient light, the **Ambient Light Measurement** screen, as shown in **Figure 49,** is displayed.

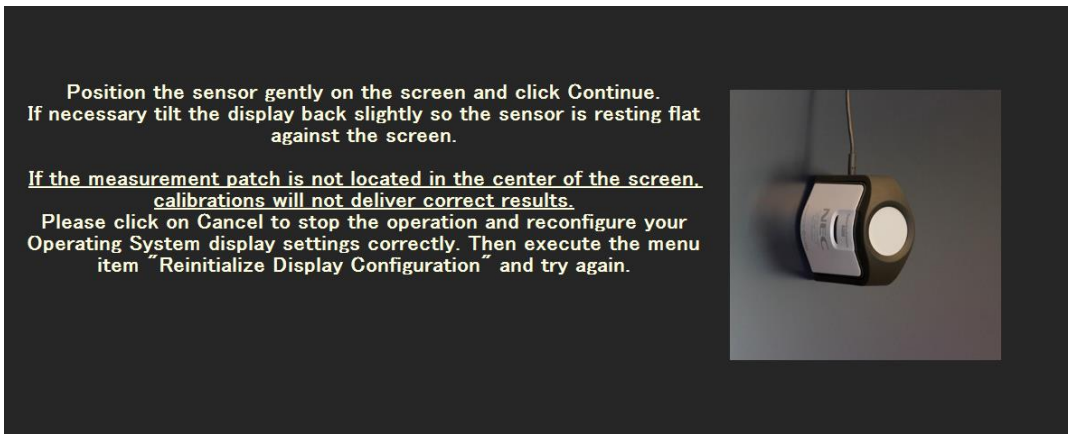
Position the sensor gently on the screen and click Continue.
If necessary tilt the display back slightly so the sensor is resting flat against the screen.
If the measurement patch is not located in the center of the screen, calibrations will not deliver correct results.
Please click on Cancel to stop the operation and reconfigure your Operating System display settings correctly. Then execute the menu item "Reinitialize Display Configuration" and try again.

Figure 49: Ambient Light Measurement Screen

A screen is displayed which describes the purpose of measuring the ambient light. Click on the **Continue** button at the bottom left of the screen to start. Please follow the instructions on the screen. After the measurement,

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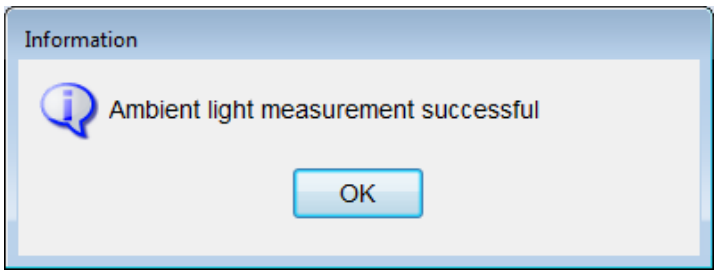

Figure 50: Ambient light measurement successful

NOTE: External sensors which can measure ambient light are i1 Display2, ColorMunki, i1 Pro, Spyder3, i1Display Pro, LXPlus, Luxi, MD-N2M5B, LXcan or LXchroma. Please make sure to connect the external sensor and test the connection. Please refer to **7.2.6 Sensor Setup** (page 72) for correct sensor selection and connection test. Ambient light measurement using an external sensor works even if **Preferred Sensor Selection** is set to **Display Sensor**.

- **Ambient Light Compensation tab**

Click the tab **Ambient Light Compensation** to display the **Calibration Setup - Ambient Light Compensation** dialog box, as shown in **Figure 51**. This tab is active for certain NEC MD display models. If **Use Ambient Light Compensation** has been selected, the current ambient light condition can be measured via the display's ambient light sensor. After that you may edit the captured value for correct operation of the Ambient Light Compensation function during normal operation.

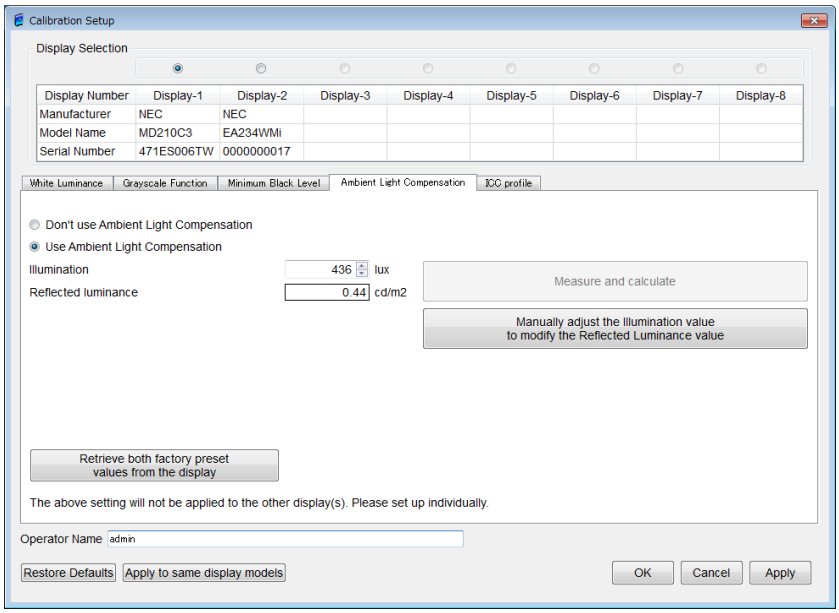
Calibration Setup
Display Selection
Display Number | Display-1 | Display-2 | Display-3 | Display-4 | Display-5 | Display-6 | Display-7 | Display-8
Manufacturer | NEC | NEC
Model Name | MD210C3 | EA234WMi
Serial Number | 471ES006TW | 0000000017
White Luminance
Grayscale Function
Minimum Black Level
Ambient Light Compensation
ICC profile
Don't use Ambient Light Compensation
Use Ambient Light Compensation
Illumination
436 lux
Reflected luminance
0.44 cd/m2
Measure and calculate
Manually adjust the Illumination value to modify the Reflected Luminance value
Retrieve both factory preset values from the display
The above setting will not be applied to the other display(s). Please set up individually.
Operator Name
admin
Restore Defaults
Apply to same display models
OK
Cancel
Apply

Figure 51: Calibration Setup - Ambient Light Compensation dialog box

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Use/Don't use Ambient Light Compensation

Select between **Don't use Ambient Light Compensation** or **Use Ambient Light Compensation.** Ambient Light Compensation is active during Calibrations, Conformance Tests, White/Black Luminance Measurements and Uniformity Tests.

Illumination

Shows the value of illumination (ambient light, unit: lux) as measured by the display's ambient light sensor at time of installation. The displayed value (1 to 1000 lux) may be modified to a value measured with an external Illuminance meter (Lux meter).

Reflected luminance

The Illumination value is used to calculate and display the **Reflected luminance** (Unit: cd/m^2). If you want to edit the **Reflected luminance**, click on the **Manually adjust the Illumination value to modify the Reflected Luminance value** button. The **Reflected luminance Setup** dialog box will be shown similar to **Figure 52**.

Manually adjust the Illumination value to modify the Reflected Luminance value

The **Illumination** value and the calculated **Reflected Luminance** value are displayed in the **Reflected Luminance Setup** dialog box, as shown in **Figure 52**. In order to update the **Reflected Luminance** value, click this button to modify this value.

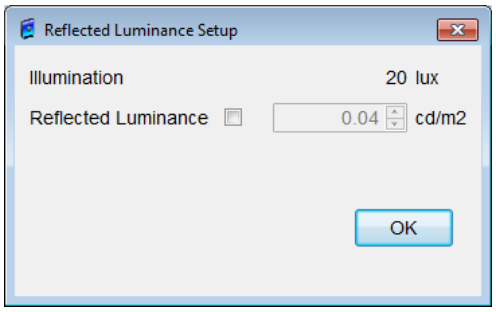

Figure 52: Reflected Luminance Setup dialog box

Select the check box to modify the **Reflected luminance** value manually (Range: 0.01 to 9.99 cd/m^2). Click on the **OK** button to calculate the Diffuse Reflection value and transfer this value back into the display. No modification will happen if the check box remains unchecked. The **Illumination** value is not updated.

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Retrieve both factory preset values from the display

The initial factory shipment value of the Diffuse Reflection coefficient is transferred from the display. The reflected luminance value is then calculated using the Illuminance value measured by the ambient light sensor of the display. The formula is:
Reflected luminance = Illuminance x Diffuse Reflection coefficient
Example: 0.04 cd/m^2 = 20 lux x 0.002 cd/m^2 per lux.
When using MD215MG, MD211G5, MD212G3 or MD302C6, this function is disabled.

Measure and calculate

The illumination is measured automatically and the reflected luminance value will be calculated.
When using MD215MG, MD211G5, MD212G3 or MD302C6, this function is enabled.

IMPORTANT NOTES:

- It is very important to keep the ambient light conditions during this adjustment process and during any calibration process on the same level.

- Be very careful and do not change ambient light conditions drastically around the display during a calibration process. Otherwise an incorrect diffuse reflection coefficient will be stored in the display and the **Ambient Light Compensation** function will not work correctly.

- The Diffuse Reflection coefficient typically ranges from 0.002 to 0.006 cd/m2 per lux and highly depends on the type of anti-reflection treatment applied on the screen surface. Changes may happen over time due to aging and/or poor surface treatment.

- For a newly installed display you may use the function **Retrieve both factory preset values from the display** to adjust the **Ambient Light Compensation** in the display correctly. If this action reports unreasonably high Reflected Luminance values, use the "**Manually adjust the Reflected Luminance value**" function in addition.

- Please use the function "**Manually adjust the Reflected Luminance value**" with utmost care. For a realistic **Reflected luminance** value in the actual installation environment, a calibratable luminance meter ("telescopic type" or "distance

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measuring") is required to measure the reflected luminance of the screen surface of a display – with the display's power switched OFF and a clean surface.

- The last Diffuse Reflection coefficient value uploaded to the display is used to compensate ambient light changes by correcting the DICOM curve in the display.

- When using MD215MG, MD211G5, MD212G3 or MD302C6, run the calibration after setting Ambient Light Compensation. Ambient Light Compensation isn't reflected until calibration is completed.

- **ICC profile tab**

The **Calibration Setup - ICC profile** dialog box is displayed by clicking on the ICC Profile tab. Any changes in this tab are only possible when a color display is selected.

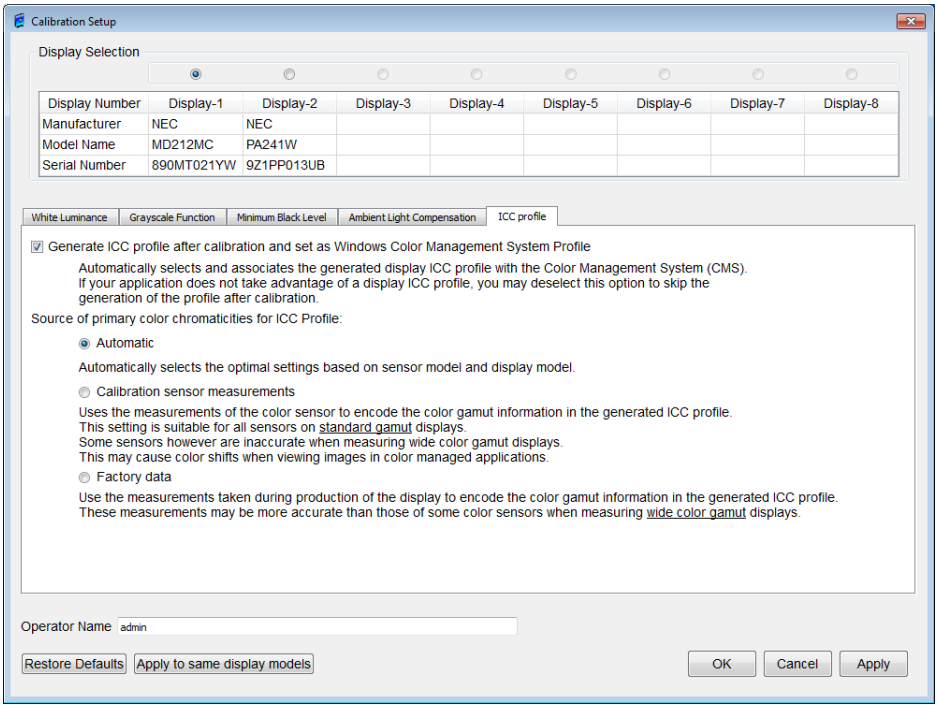
Calibration Setup
Display Selection
Display Number
Display-1
Display-2
Display-3
Display-4
Display-5
Display-6
Display-7
Display-8
Manufacturer
NEC
NEC
Model Name
MD212MC
PA241W
Serial Number
890MT021YW
9Z1PP013UB
White Luminance
Grayscale Function
Minimum Black Level
Ambient Light Compensation
ICC profile
Generate ICC profile after calibration and set as Windows Color Management System Profile
Automatically selects and associates the generated display ICC profile with the Color Management System (CMS).
If your application does not take advantage of a display ICC profile, you may deselect this option to skip the generation of the profile after calibration.
Source of primary color chromaticities for ICC Profile:
Automatic
Automatically selects the optimal settings based on sensor model and display model.
Calibration sensor measurements
Uses the measurements of the color sensor to encode the color gamut information in the generated ICC profile.
This setting is suitable for all sensors on standard gamut displays.
Some sensors however are inaccurate when measuring wide color gamut displays.
This may cause color shifts when viewing images in color managed applications.
Factory data
Use the measurements taken during production of the display to encode the color gamut information in the generated ICC profile.
These measurements may be more accurate than those of some color sensors when measuring wide color gamut displays.
Operator Name
admin
Restore Defaults
Apply to same display models
OK
Cancel
Apply

Figure 53: Calibration Setup - ICC profile dialog box

Generate ICC profile after calibration and set as Windows Color Management System Profile

If this checkbox is checked, an ICC profile will be created after the calibration and will be automatically added to the Windows Color Management System.

However, if you are logged in as a user without administrative

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rights, an ICC profile will not be created. Also depending on the workstation environment, the ICC profile may not be recognized automatically by the Windows Color Management System (CMS). In this case, you need to set it up manually.

NOTE: For most current applications in the medical environment, an ICC profile is not required, therefore this box may usually be unchecked. You cannot change any settings if the option **Generate ICC profile after calibration and set as Windows Color Management System Profile** check is unchecked.

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Source of primary color chromaticity values for ICC Profile

Select from the following three options for the value to use when creating the ICC profile.

- **Automatic**

When creating the ICC profile, a suitable value is automatically selected between sensor measurement values and measured values from the factory.

- **Calibration sensor measurements**

Use the values of the sensor to create the ICC profile.

- **Factory data**

Use the values from the factory to create the ICC profile.

7.2.6. Sensor Setup

When **Sensor Setup** is clicked in **Calibration** or **Conformance Test**, the Sensor Setup dialog box, as shown in **Figure 54**, is displayed. This dialog box is used to set up the optical calibration sensor which is used for each display.

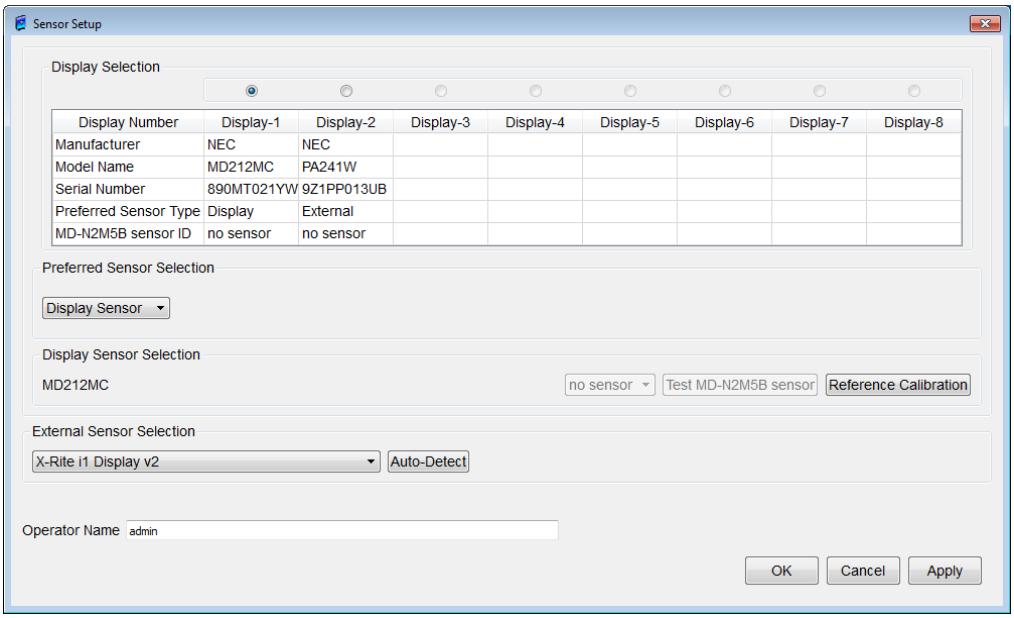

Figure 54: Sensor Setup dialog box

Display Selection Displays can be selected one at a time by clicking the radio button above the display.

Preferred Sensor Selection

A listbox to select the principal type of sensor which is used for the selected display, see **Figure 55**.

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NOTE:
For scheduled execution or test from the network, the display sensor is used regardless of the sensor selection. When a **display sensor** is used with a wide format display, be sure to set the EXPANSION mode to “FULL” in the OSD of the display.

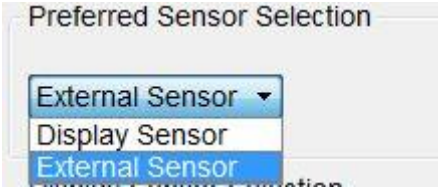

Figure 55: Preferred Sensor Selection Listbox

Display Sensor Selection

If a display with integrated front sensor is selected, the model name of the display is shown. If the selected display does not have a front sensor, “MD-N2M5B” is shown. To select **Display Sensor** as the **Preferred Sensor**, it is necessary to **select a serial number** for the retractable sensor model **MD-N2M5B** to be used for this display.

NOTE: The following Serial Number Selection Dialog box will only be shown, if a retractable sensor model **MD-N2M5B** is actually connected to the system. Otherwise, only the message “no sensor” is visible.

Serial Number Selection

It is possible to select the serial number of the retractable sensor in use. If a certain serial number has already been used for a different display, and the **OK** or **Apply** button is clicked, the last setting becomes effective, and then this retractable sensor is no longer set up for the previously specified display.

Test MD-N2M5B Sensor button

This starts a test by swinging the arm of the MD-N2M5B sensor out and back in. After selecting the serial number from the Serial Number Selection listbox, click the MD-N2M5B Sensor Test button to check the operation of the MD-N2M5B sensor assigned to the selected display. If a serial number has not been selected, it is not possible to click the **Test MD-N2M5B Sensor** button.

Reference Calibration button

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Reference Calibration is used to re-adjust either the integrated front sensor of a display or a MD-N2M5B mounted on top of the display. To re-adjust a display sensor, both the display sensor and an external sensor need to be connected. Click the **Reference Calibration** button and perform the re-adjustment by following the displayed messages.

NOTES:

- The **Reference Calibration** button is inactive if the selected display either does not have a front sensor or the serial number of a MD-N2M5B sensor was not selected.

- **MD212G3/MD215MG/MD211G5/MD302C6 models do not support Reference Calibration**! The **Reference Calibration** button is inactive (grayed out) if one of these models is selected. Therefore, please ignore the message "Reference Calibration is highly recommended" for these models.
  Instead, please select **External Sensor** as the **Preferred Sensor.** The integrated front sensor of these models is re-adjusted automatically during a calibration using an **External Sensor**.

- **Luminance Offset**: An integrated front sensor or MD-N2M5B sensor can only measure luminance in the periphery of the display screen surface. However, due to the characteristics of an LCD display, there are differences in luminance and color between the central region and the periphery of the display screen surface. When a front sensor or MD-N2M5B sensor is being used, it is necessary to re-adjust such differences (offset) in comparison with an external sensor. In case of integrated front sensors, this offset is stored in the display itself. In case of the MD-N2M5B sensor, the offset is stored in **GammaCompMD QA Client**.

- **Special care using MD-N25B:** After the **OK** button is clicked in the Reinitialize Display Configuration dialog box, as shown in **Figure 89**, specify the serial number again. If this causes the combination of the display and the MD-N2M5B sensor to change then it is necessary to repeat the reference calibration.

- Reference calibration cannot be done with an external sensor without color support. Please also refer to **Additional considerations - Using sensor models without color measurement capability** below for details.

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External Sensor Selection

The external sensor can be selected from the **External Sensor Selection** listbox, as shown in **Figure 56**.

NOTE: Only one external sensor is supported at time and it will be the last selected sensor model.

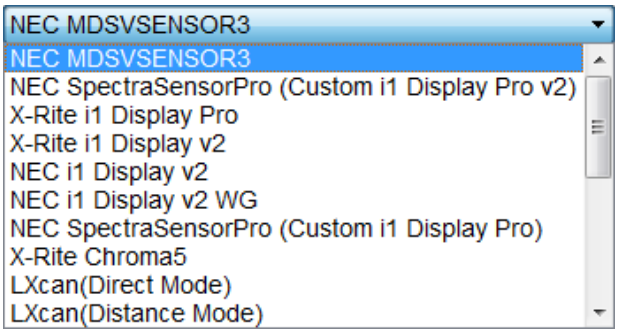

Figure 56: External Sensor Selection Listbox

Auto-Detect button — Clicking on this button allows the external sensor to be automatically detected, even if a sensor was not yet selected from the **External Sensor Selection** listbox described above.

OK button — Saves the sensor setting to the selected display and closes the dialog box. The **OK** button cannot be clicked unless the **Operator Name** is entered.

Cancel button — Closes the dialog box without applying any changes. However, any settings that were applied by clicking the **Apply** button cannot be returned to its previous state.

Apply button — Applies the settings but does not close the dialog box. The **Apply** button cannot be clicked unless the **Operator Name** is entered.

Additional considerations

Using external sensors — If a calibration or test is executed, the sensor contact position guide, as shown in **Figure 57,** is displayed. Position the sensor on the display according to the guidance and click the **Continue** button at the bottom left of the screen to start the measurement.

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A LCD display is fragile and may be damaged if the external sensor is forcefully pressed against it. Never attach a sensor with suction cups to the display. Always use the supplied cable and suspend the sensor with a weight so that the sensor is stationary in front of the display.

If the external sensor is separated from the screen during calibrations or tests (i.e. by falling off), the process may fail. Be sure to keep the external sensor in place, until the process is completed. If the sensor has been displaced, position the sensor on the screen again and best restart the process.

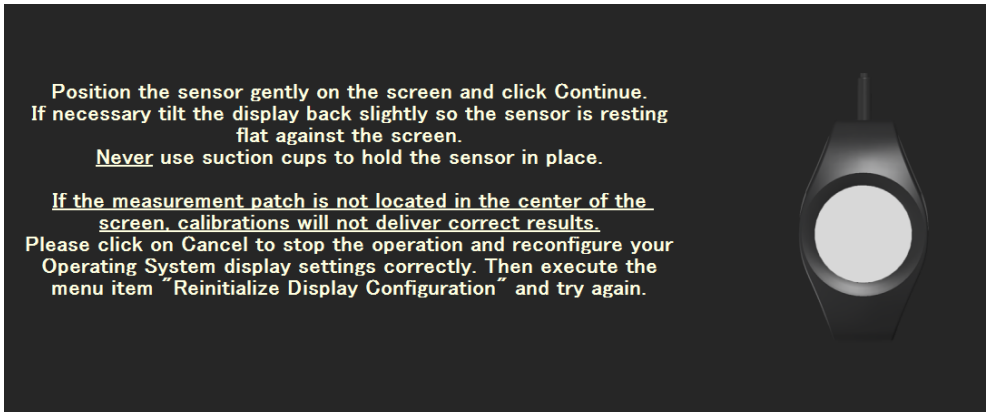
Position the sensor gently on the screen and click Continue.
If necessary tilt the display back slightly so the sensor is resting flat against the screen.
Never use suction cups to hold the sensor in place.
If the measurement patch is not located in the center of the screen, calibrations will not deliver correct results.
Please click on Cancel to stop the operation and reconfigure your Operating System display settings correctly. Then execute the menu item "Reinitialize Display Configuration" and try again.

Figure 57: Sensor Contact Position Guide

Black Level setup

Several supported external sensor models require the adjustment of the Black Level (Dark Current) for improved accuracy. This Black Level measurement will be performed before any calibrations and tests. Please follow the guidance on the screen. In most cases, the sensor needs to be placed on a dark surface for this setup.

Figure 58: X-Rite Chroma 5 during black level adjustment (Example)

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Sensor selection rules

External sensors cannot be used for all calibration operations. For scheduled display calibrations or remote calibrations and DICOM conformance tests, only a display sensor is appropriate.
On the other hand, some external sensor models are unable to be used for Display Quality Assurance (QA), depending on regional / national regulations.

NOTE: If an external sensor was selected for a display with Display Sensor, but this external sensor is not connected during a measurement or calibration activity, GammaCompMD QA will automatically change to the display sensor, without notification. Only the respective reports will reveal this change.

Using sensor models without color measurement capability

Typical instruments used for Quality Assurance, i.e. LXplus, LXcan or Luxi/Solo Light do not support color measurements. White luminance calibration modes, other than **Native** and **No Change,** as well as a **Reference Calibration** of a color display front sensor are not supported. Please refer to **7.2.5 Calibration Setup** (page 64) regarding the White Luminance Calibration mode and **Reference Calibration** button in this chapter regarding reference calibration.

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7.3. Conformance Tests

Click **Conformance Tests** in the **Display Maintenance** screen to display **Figure 59**, **Conformance Test screen** is displayed.

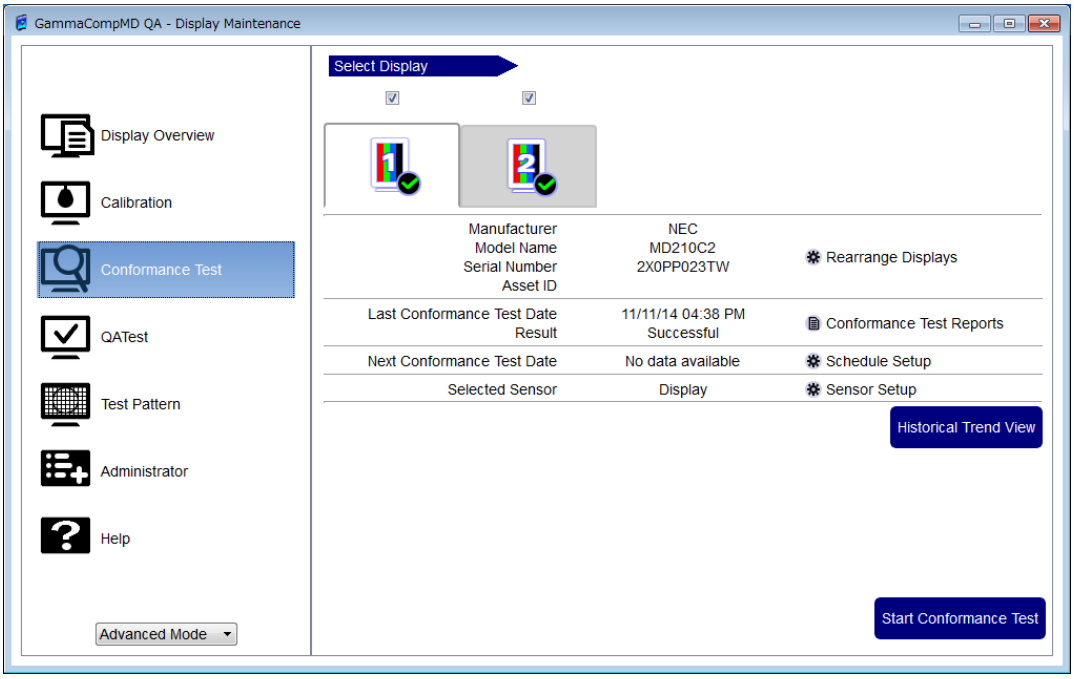

Figure 59: Conformance Test Screen

7.3.1. Perform a Conformance Test

Tick the check box above the display icons to select the display. Multiple displays may be selected. Then click on **Start Conformance Test** at the bottom right of this menu. The conformance test will start for the selected display(s). Please follow the instructions on the screen.

If both display sensors and external sensors have been selected for various displays, a conformance test starts with the displays with display sensors, then continues with displays for which external sensors are selected. Although a conformance test is executed simultaneously for multiple display sensors (except MD212G3/MD215MG/MD211G5 and MD302C6), it is executed in ascending order of display numbers for external sensors.

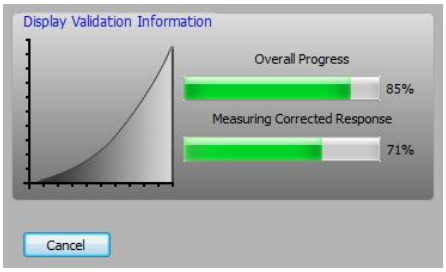

Figure 60: Status screen on target display during conformance test

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After a **Conformance Test** has completed, the **Conformance Test Report dialog box** (**Figure 61**) and the **White & Black Luminance Measurement Report dialog box** (**Figure 62**) are shown on each display.

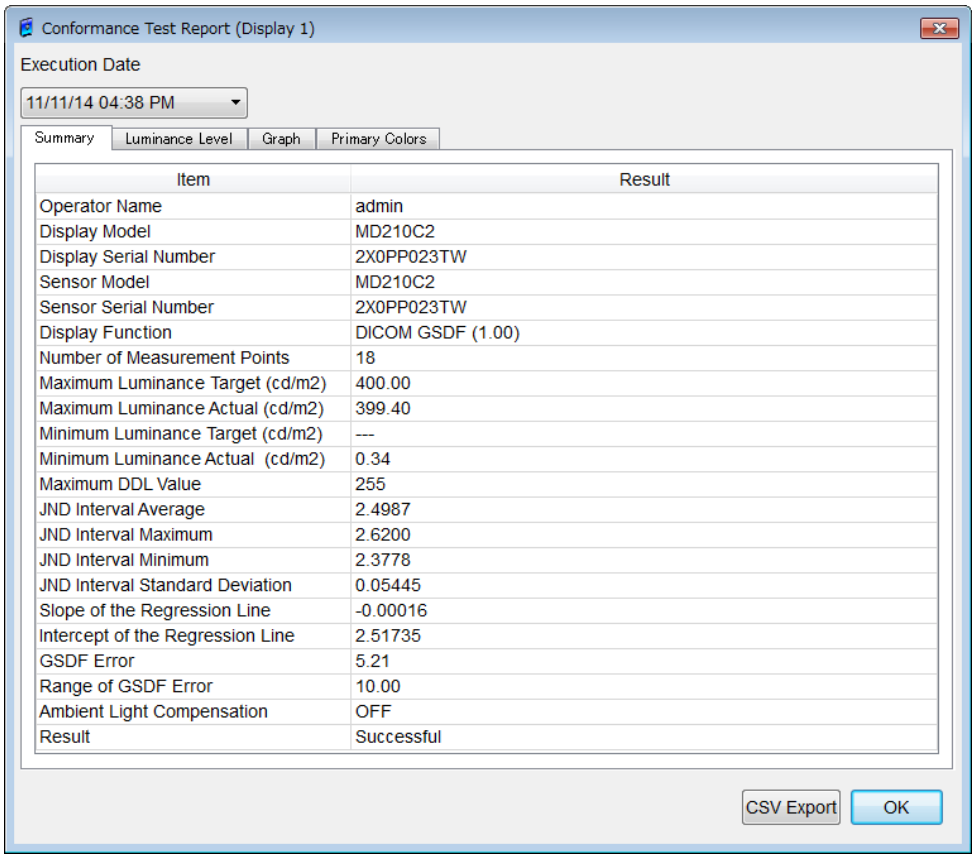

Figure 61: Conformance Test Report dialog box

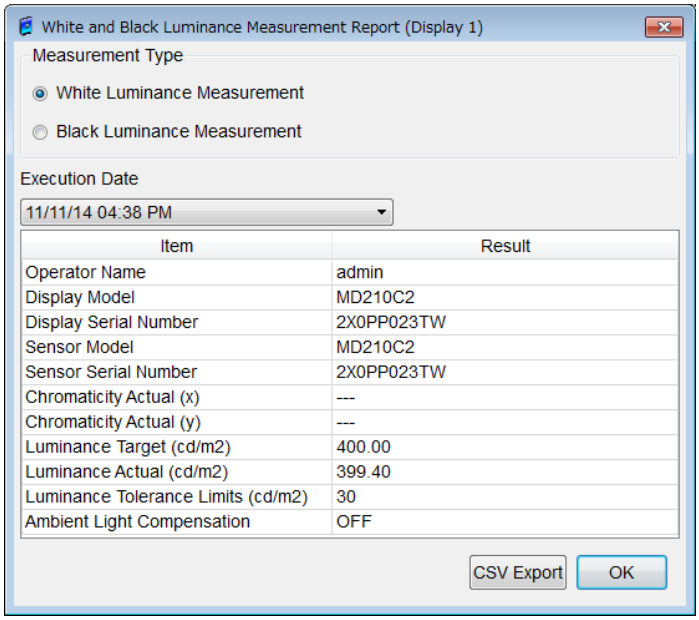

Figure 62: White & Black Luminance Measurement Report dialog box

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7.3.2. Rearrange Displays

Click **Rearrange Display** in **Conformance test** to rearrange display. See **7.1.1 Rearrange Display** (page 51).

7.3.3. Conformance Test Reports

Click **Conformance Test Reports** in **Conformance test** to display the **Conformance Test Reports** dialog box, see **Figure 63**.

NOTE: Conformance test reports are shown based on a DICOM standard Grayscale Display Function (GSDF). This function can only be used if DICOM standard Grayscale Display Function (GSDF) in **Calibration Setup** has been selected.

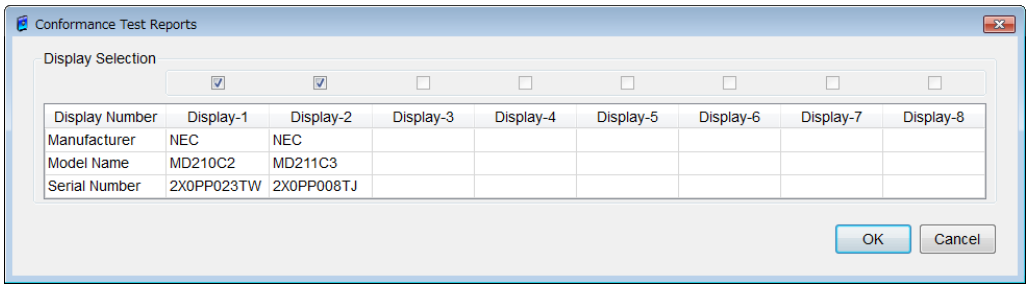

Figure 63: Conformance Test Reports dialog box

Show the **Conformance Test Report: Summary** dialog box for the selected display, see **Figure 64**. The **Summary** tab will be shown first when the **OK** button is clicked. Click the **Graph** (**Figure 66**) or **Primary Colors** (**Figure 67**) tabs to display the corresponding dialog boxes. The **OK** button cannot be clicked if no display is selected.

- **Common settings for each tab**

Execution Date — If the listbox under **Execution Date** is clicked, the latest report will be displayed at the top, with previous reports underneath in order of date and time. Click the date you wish to view and that day's measurement report will be displayed.

CSV Export button — Shows **Save Report in CSV Format** dialog box. Reports can be saved as a CSV file.

OK button — Close the dialog.

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- **Summary tab**

Shows the **Conformance Test Report: Summary** dialog box, see **Figure 64**. The list contains the following items**:** Operator Name, Display Model, Display Serial Number, Sensor Model, Sensor Serial Number, Display Function, Number of Measurement Points, Maximum Luminance Target (cd/m^2), Maximum Luminance Actual (cd/m^2), Minimum Luminance Target (cd/m^2), Minimum Luminance Actual (cd/m^2), Maximum DDL Value, JND Interval Average, JND Interval Maximum, JND Interval Minimum, JND Interval Standard Deviation, Slope of the Regression Line, Intercept of the Regression Line, GSDF Error, Range of GSDF Error and Result (Successful/Failed).

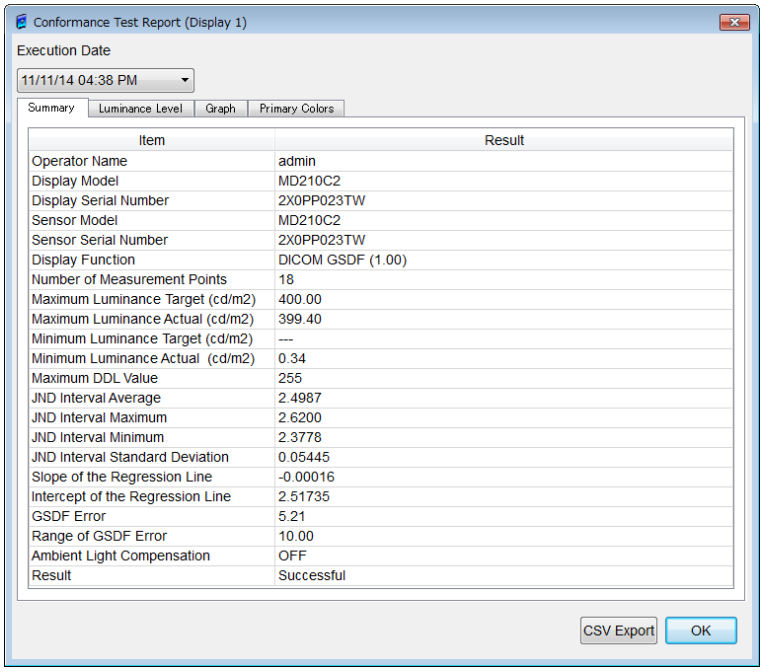

Figure 64: Conformance Test Report: Summary dialog box

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- **Luminance Level tab**

Shows the **Conformance Test Report:** Luminance Level Dialog box, see **Figure 65**.

The luminance value of each gray scale is displayed.

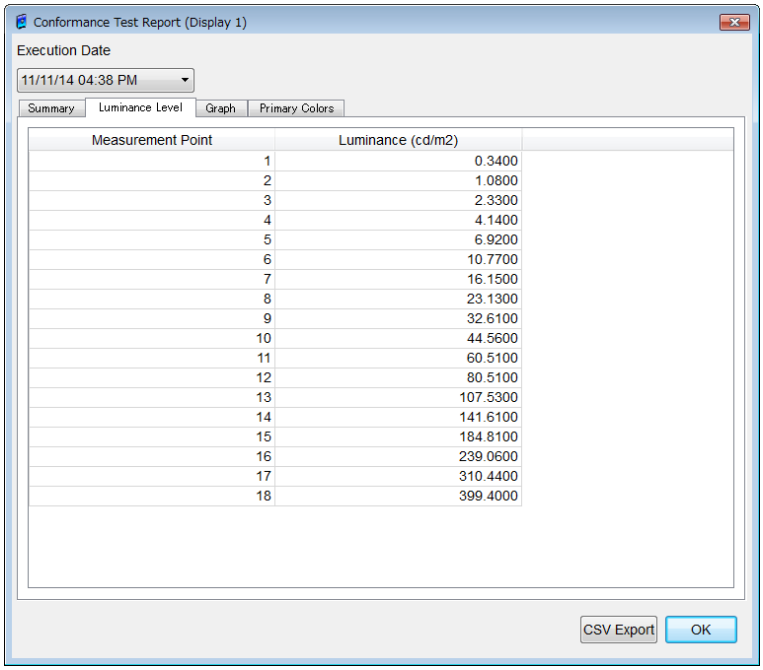

Figure 65: Conformance Test Report: Luminance Level dialog box

- **Graph tab**

Shows the **Conformance Test Report: Graph** dialog box.

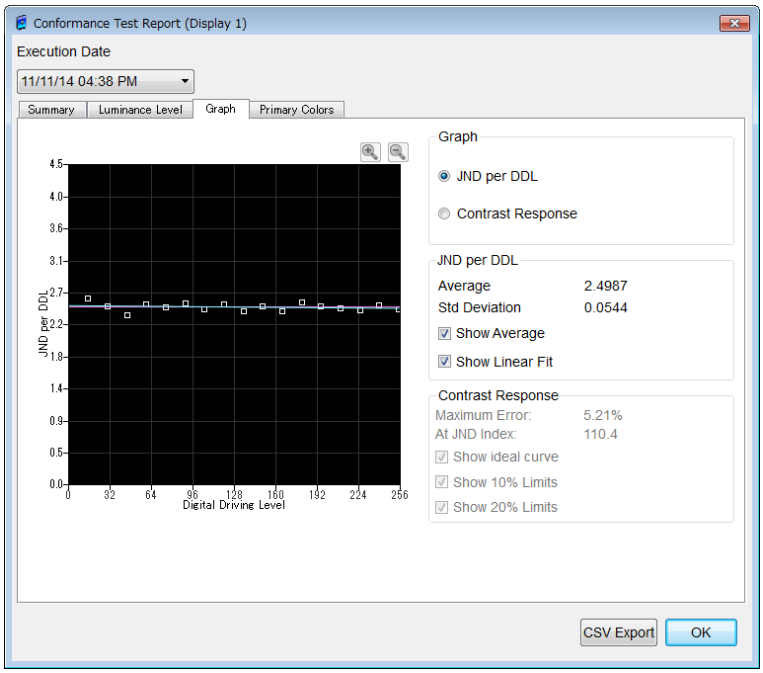

Figure 66: Conformance Test Report: Graph dialog box

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Graph

JND per DDL	Shows a graph of the JND interval per DDL calculated from the luminance characteristics after calibration in the conformance test.
Contrast Response	Shows a contrast response graph calculated from the luminance characteristics after calibration in the conformance test. The contrast response graph is a logarithmic base 10 representation.
JND per DDL	The graph shows JND per DDL for a selected **Execution Date**. Average and linear fit lines are shown or hidden by checking or un-checking the **Show Average** and **Show Linear Fit** boxes.
Contrast Response	This graph shows the contrast response for a selected **Execution Date**. The ideal DICOM curve, as well as 10% limit curves and 20% limit curves are shown or hidden by checking or un-checking the **Show ideal curve**, **Show 10% Limits** and **Show 20% Limits** boxes.
Buttons	Click and drag to draw a rectangle around a certain section, then use these buttons to zoom in or zoom out within the graph.

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- **Primary Colors tab**

Shows the **Conformance Test Report: Primary Colors** dialog box, see **Figure 67**. This shows the CIE x and y values measured for each primary color (red, green and blue).

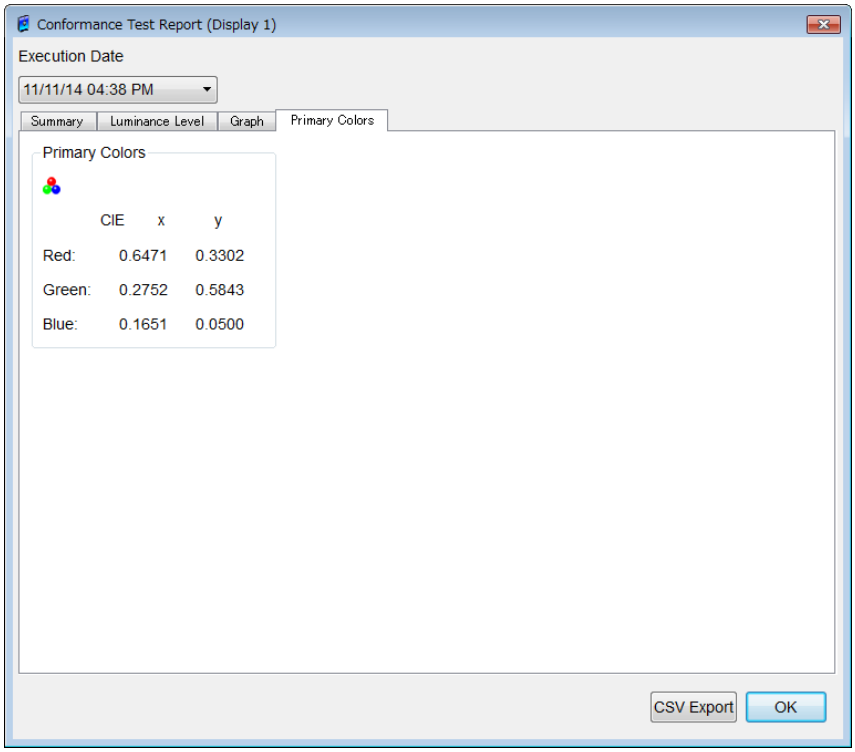

Figure 67: Conformance Test Report: Primary Colors dialog box

7.3.4. Schedule Setup

Click **Schedule Setup** in **Conformance Test** to list and modify schedules, if required.
See **7.2.4 Schedule Setup** (page 60).

7.3.5. Sensor Setup

Click **Sensor Setup** in **Conformance Test** to list and modify the setup of sensors, if required.
See **7.2.6 Sensor Setup** (page 77).

7.3.6. Historical Trend View

Trend graphs showing various measurement results. See **11 Trend Viewer** (page 156).

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7.4. QA Test

Click **QA Test** in the **Display Maintenance** to display **Figure 68**, **QA Test screen** is displayed.

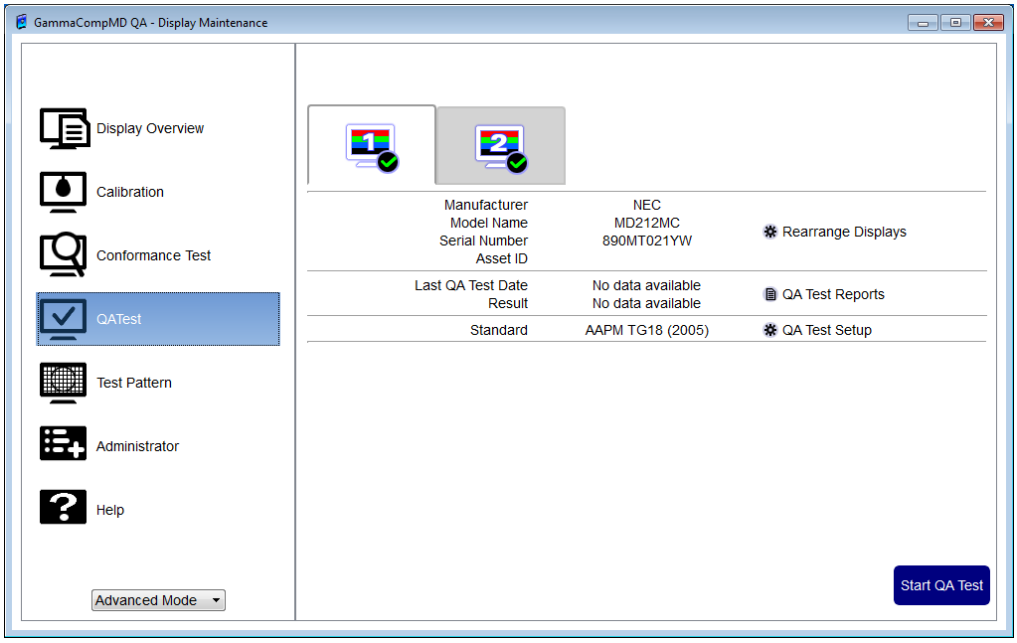

Figure 68: QA Test screen

7.4.1. QA Test Start

Click **Start QA Test** to display **Select Target Display(s) for QA Test** dialog box, as shown in **Figure 69**. Verify that the **Standard** at the top left is correct. If not correct, change the test standard with **7.4.4 QA Test Setup** (page 97). You can click **OK** button after entering the **Tester Name**.

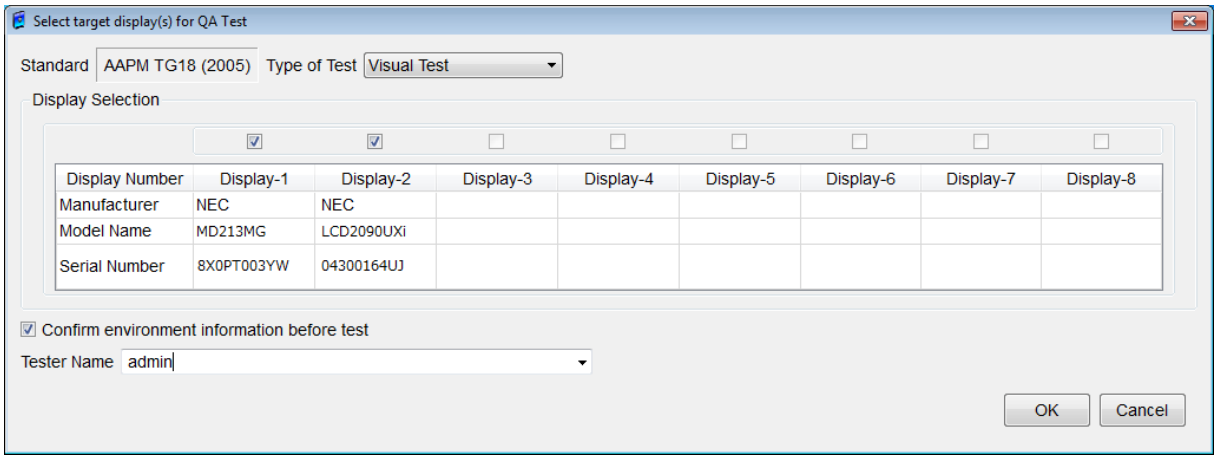

Figure 69: Select Target Display for QA Test dialog box

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Select the type of test to be performed. The selection varies with the selected QA standard. The following test variants are available in the GammaCompMD QA Standard Version:

AAPM TG18 (2005)	JESRA X-0093	ACR AAPM SIIM (2012)
Visual Test	Daily constancy test	Daily Visual Test
Acceptance Test	Acceptance test	Full Visual Test
Monthly/Quarterly Test	Comprehensive constancy test	Acceptance Test
Annual Test		Monthly Test
		Quarterly Test
		Annual Test

NOTES:

- Please perform a calibration with recommended maximum & minimum luminance value before performing the test of ACR AAPM SIIM. Refer to 7.2.1 Perform a Calibration (page 54) and 15 Appendix for the category of ACR AAPM SIIM (2012) (page 173).

- QA tests complying with IEC 62563-1, DIN V 6868-57 and DIN 6868-157 are only available in the **EU Limited Edition**. Please refer to the separate QAXRAY Module User Manuals to perform QA tests using these regional standards.

If the **Confirm environment information before test** checkbox is checked, the **Test Environment** dialog box (**Figure 70**) after select the **Type of Test** then click **OK** button. Please enter each item if necessary.

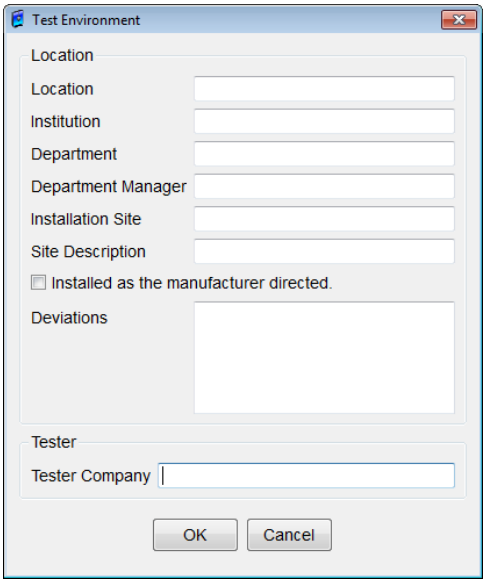

Figure 70: Test Environment dialog box

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The **QA Test** dialog box (**Figure 71**) will be shown on the upper left of the selected display when you click on the **OK** button. In case of ACR AAPM SIIM (2012), it will show the **QA Test** dialog box (**Figure 72**). Please continue the operation if **Standard** and **Type of Test** are correct.

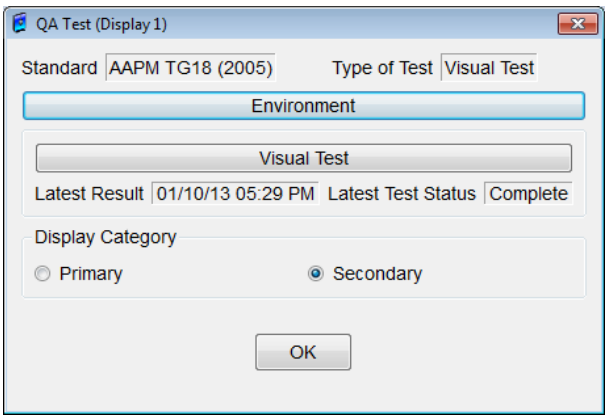

Figure 71: QA Test dialog box

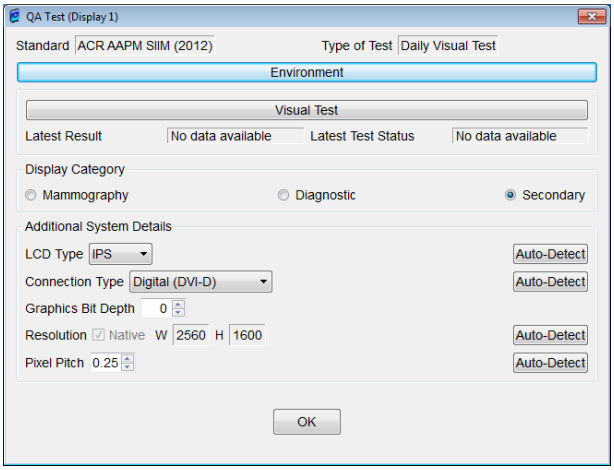

Figure 72: QA Test dialog box for ACR AAPM SIIM QA tests

- **Environment** button Opens the **Image Processing Environment** dialog box.

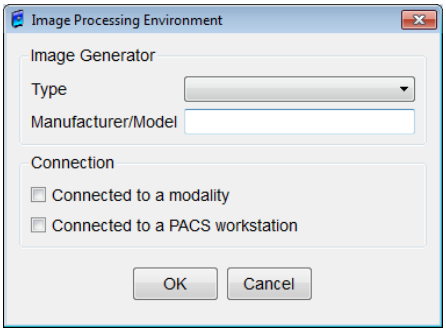

Figure 73: Image Processing Environment dialog box

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- **Image Generator**

Select the type (CT/MR/PACS) from the listbox. If required for documentation, enter the manufacturer and model name of the Image Generator.

- **Connection**

Check the applicable connection status. In most cases, it will be a connection to a PACS workstation.

- **Visual Test** button

Starts the visual test part of the QA test. Follow the instruction in the QA Visual Test Verification dialog box and visually verify the screen. Depending on selected QA test standard, a series of QA test images will be displayed sequentially for your visual assessment. Click **Passed,** if there are no problems and **Failed** if you recognize any problem or **Abort** to exit the test.

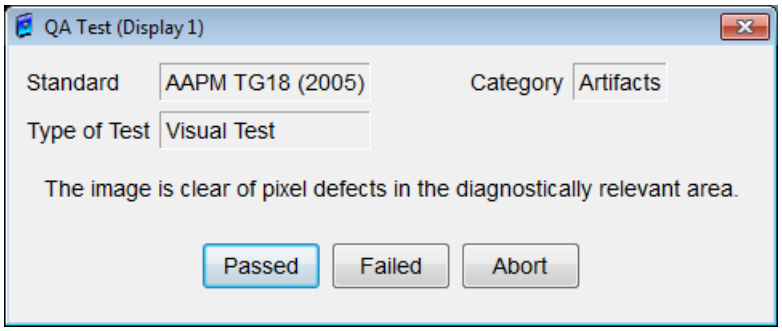

Figure 74: QA Visual Test dialog

The process returns to the **QA Test** dialog, as shown in **Figure 71** when all the visual tests are done.

- **Measurement Test** button

For measurement tests, use **Measurement Test** by clicking on this button. The **Sensor Contact Position Guide** (**Figure 57**) will be displayed. Please position an external sensor on the screen. The measurements will start when you click the **Continue** button.

NOTE: If an external sensor is not connected to the PC, the Measurement Test button is inactive. Click the **OK** button once, then connect an external sensor to the PC and then - after recognition of the sensor in **Sensor Setup** - please perform the QA Test again.

- **Display Category**

The category is determined by required minimum luminance levels (measured in cd/m^2). These are fixed in the AAPM or ACR AAPM SIIM or JESRA standard.

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AAPM TG18 (2005) Primary Class	Min. 170 cd/m2
AAPM TG18 (2005) Secondary Class	Min. 90 cd/m2
ACR AAPM SIIM (2012) Mammography	Min. 420cd/m2
ACR AAPM SIIM (2012) Diagnostic	Min. 350cd/m2
ACR AAPM SIIM (2012) Secondary	Min. 250cd/m2
JESRA X-0093 Grade 1	Min. 170 cd/m2
JESRA X-0093 Grade 2	Min. 100 cd/m2

Select the appropriate one for the display under test. Refer to 15 Appendix for the category of ACR AAPM SIIM (2012).

- **OK** button

The **QA Test Report** will be shown separately on every display under test. Refer to **7.4.3 QA Test Reports** (page 95) for details on this **QA Test Report** dialog box.

In case of a QA test complying with the ACR AAPM SIIM (2012) technical standard, you will the following additional items are available:

- **LCD Type** Select the **LCD Type** from the listbox. If it is unknown, press **Auto-Detect** button.
- **Connection Type** Select the **Connection Type** from the listbox. If it is unknown, press **Auto-Detect** button.
- **Graphics Bit Depth** Enter the **Graphics Bit Depth** of a video channel which connects to the target display. If True color is specified, it should be 8 bit.
- **Resolution** The **Resolution** of the display. In case of support model, it will be detected automatically. For non-support model, select or deselect the native resolution checkbox manually.
- **Pixel Pitch** Enter the Pixel Pitch of the display. If it is unknown, press **Auto-Detect** button.

NOTE: An **Acceptance Test** should be the first QA test completed before any other QA Test is made. When trying to perform any QA test before **an Acceptance Test** was performed a **Warning** dialog box is displayed, as shown in **Figure 75**.

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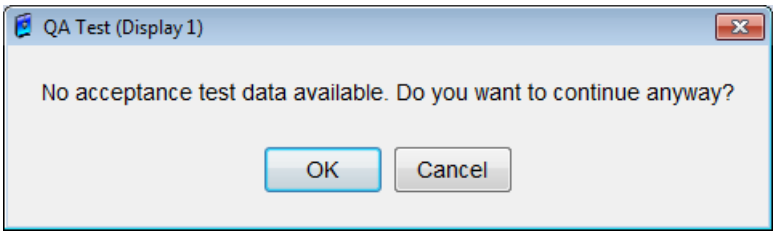

Figure 75: Warning dialog box

7.4.2. Rearrange Displays

Click **Rearrange Display** in **QA Test** to rearrange display.

See **7.1.1 Rearrange** Display (page 51).

7.4.3. QA Test Reports

Click **QA Test Reports** in **QA Test** to display the **QA Test Report Display Selection** dialog box.

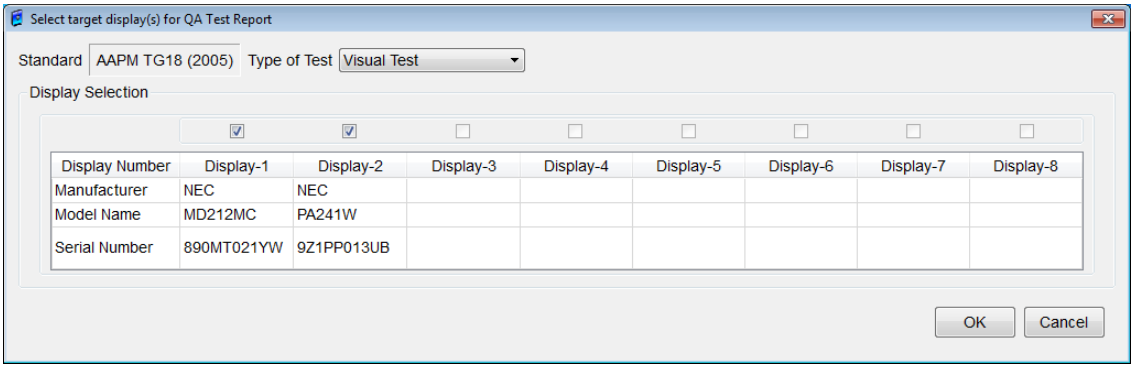

Figure 76: QA Test Report Display Selection dialog box

If **Standard** and **Type of Test** is selected correctly, select the display(s) of interest and click on the **OK** button to show the **QA Test Report** dialog box (**Figure 77**). If no display was selected, the **OK** button is inactive.

A monthly **QA Test Report** overview is shown (**Figure 78**) by checking the **Monthly** box in the upper right corner of the dialog.

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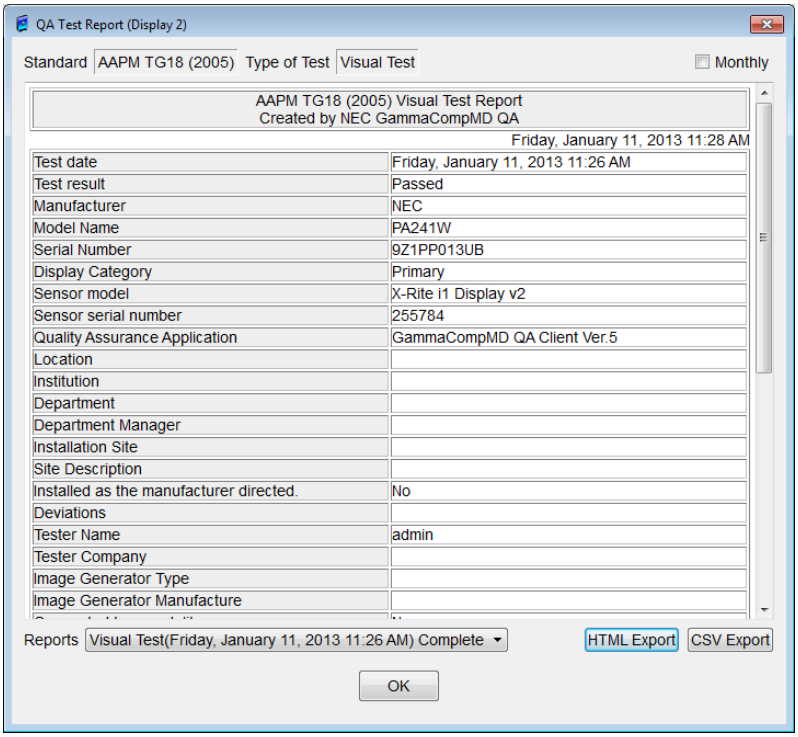

Figure 77: QA Test Report dialog box

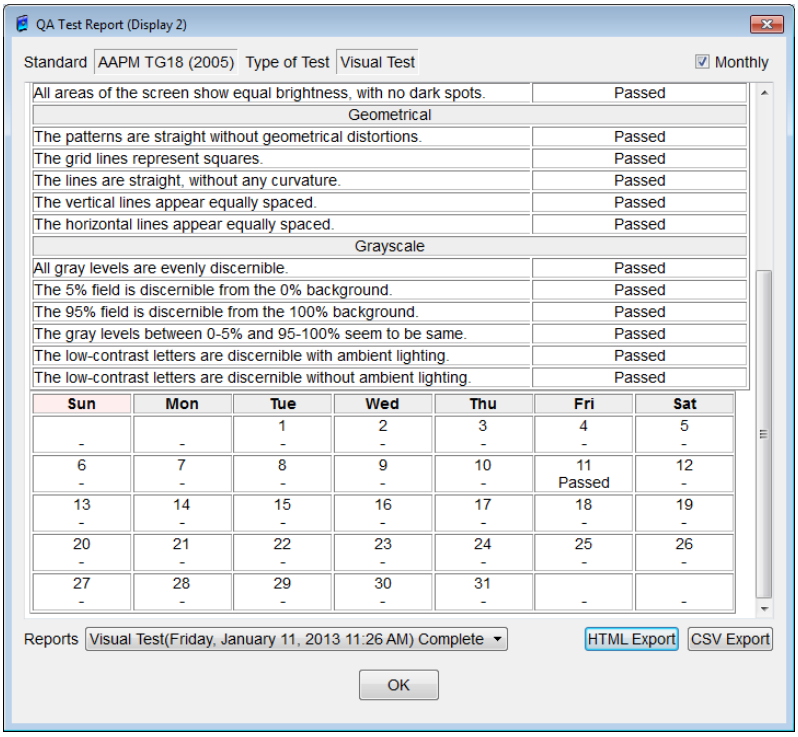
QA Test Report (Display 2)
Standard AAPM TG18 (2005) Type of Test Visual Test Monthly
All areas of the screen show equal brightness, with no dark spots. Passed
Geometrical
The patterns are straight without geometrical distortions. Passed
The grid lines represent squares. Passed
The lines are straight, without any curvature. Passed
The vertical lines appear equally spaced. Passed
The horizontal lines appear equally spaced. Passed
Grayscale
All gray levels are evenly discernible. Passed
The 5% field is discernible from the 0% background. Passed
The 95% field is discernible from the 100% background. Passed
The gray levels between 0-5% and 95-100% seem to be same. Passed
The low-contrast letters are discernible with ambient lighting. Passed
The low-contrast letters are discernible without ambient lighting. Passed
Sun Mon Tue Wed Thu Fri Sat
1 2 3 4 5
6 7 8 9 10 11 Passed 12
13 14 15 16 17 18 19
20 21 22 23 24 25 26
27 28 29 30 31
Reports Visual Test(Friday, January 11, 2013 11:26 AM) Complete
HTML Export
CSV Export
OK

Figure 78: QA Test Report dialog box (if Monthly box is checked)

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- **Reports** Listbox

If the listbox in the bottom left hand corner of the dialog box is clicked, the latest report will be displayed at the top with previous reports underneath in order of date and time. Click the date you wish to view and that day's content will be displayed.

- **HTML Export** button

Reports will be saved in HTML file format.

- **CSV Export** button

Report will be saved in CSV file format.

- **OK** button

Closes the dialog box.

7.4.4. QA Test Setup

Select **QA Test Setup** in **QA Test** to display the **QA Test Setup** dialog box (**Figure 79**). Select the name of the test standard to be used in the QA test.

Click the listbox to the right of **Standard** and choose from one of the following three standards to use in the QA test.

- **AAPM TG18 (2005)**
- **ACR AAPM SIIM (2012)**
- **JESRA X-0093**

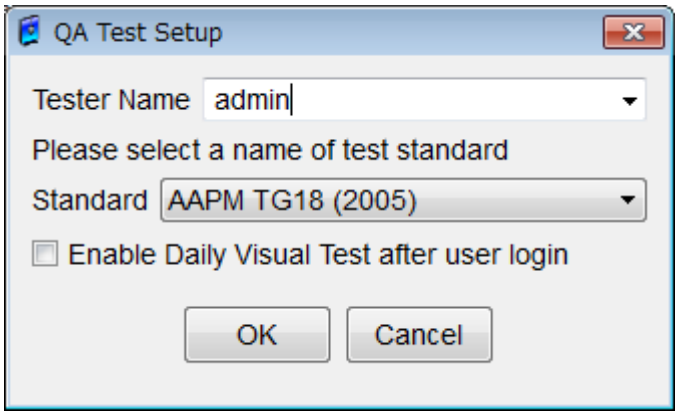

Figure 79: QA Test Setup dialog box

When you check the "Enable Daily Visual Test After user login" check box, after the login to Windows, the following test will be performed. Test is performed only once a day.

Standard	Type of Test as a Daily Visual test.
AAPM TG18 (2005)	Visual Test
ACR AAPM SIIM (2012)	Daily Visual Test
JESRA X-0093	Daily constancy test

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EU Limited Edition only:

If you are using GammaCompMD QA Client for EU and selected QAXRAY (IEC 62563-1/DIN V 6868-57/DIN 6868-157) during the installation, the QAXRAY QA test routine is started when executing QA tests. These tests and the visual representation differ from the above-mentioned menus and dialog boxes.

Please refer to the Help file which is displayed by pressing the **"?"** button on the QAXRAY start menu for details.

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7.5. Test Pattern

Click **Test Pattern** in the **Display Maintenance** menu to display **Figure 80**. The **Test Pattern** submenu is shown.

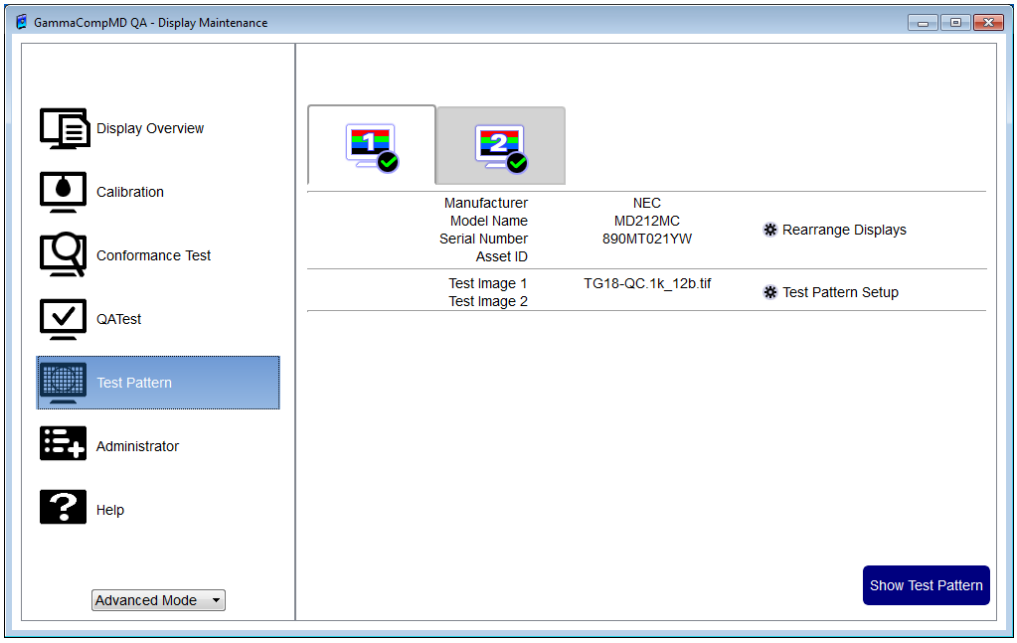

Figure 80: Test Pattern screen

7.5.1. Display the Test pattern

Click **Show Test Pattern** to open the **Select target display(s) for Test Pattern Viewing** dialog box.

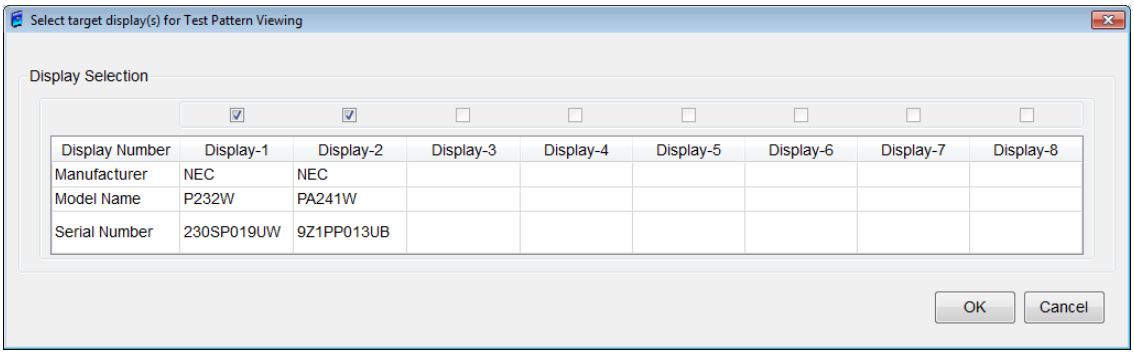

Figure 81: Selected display(s) for Test Pattern Viewing screen

Select one or more displays and click the **OK** button to display the **Show Test Pattern dialog box**, as shown in **Figure 82**. The **OK** button is inactive if no display was selected.

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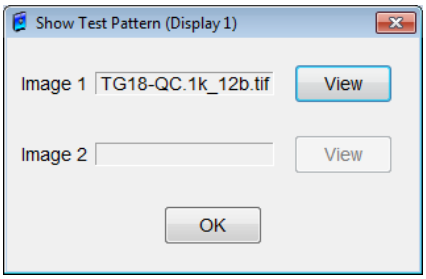

Figure 82: Show Test Pattern dialog

Clicking **View** button right of each **Image** opens a full screen test pattern on the target display, with the filename as indicated in the image file field. The **Show Test Pattern** dialog box is shown on the target display as well.

NOTE: By default, the image file name field for **Image 2** is empty (not defined).
To include, add, or change **Image 1**, set the file name as described in **7.5.3 Test Pattern Setup** (page 100).
However, when operating a **GammaCompMD QA Client** system in which passwords have been set, a Radiologist cannot use **Test Pattern Setup**. A Radiologist should ask an **Advanced** user to set up **Image 1** (and **Image 2**, if required).
Image files are installed in the following location: **[Installation folder]\qadata.**
Additional image files in .TIFF format may be added in this folder for selection.

7.5.2. Rearrange Displays

Click **Rearrange Display** in **Calibration** to rearrange display. See **7.1.1 Rearrange Display** (page 51).

7.5.3. Test Pattern Setup

Click **Test Pattern Setup** in **Test Pattern** to show the **Test Pattern Setup** dialog box (**Figure 83**). Select the image file to be displayed as a test image.

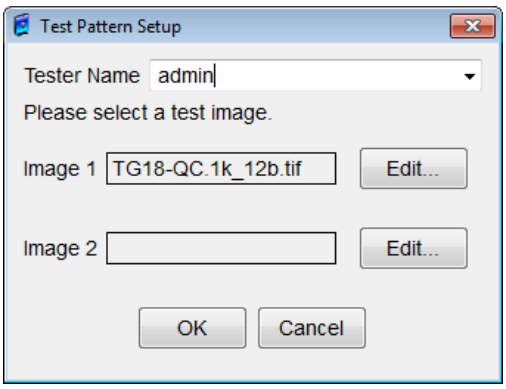

Figure 83: Test Pattern Setup dialog box

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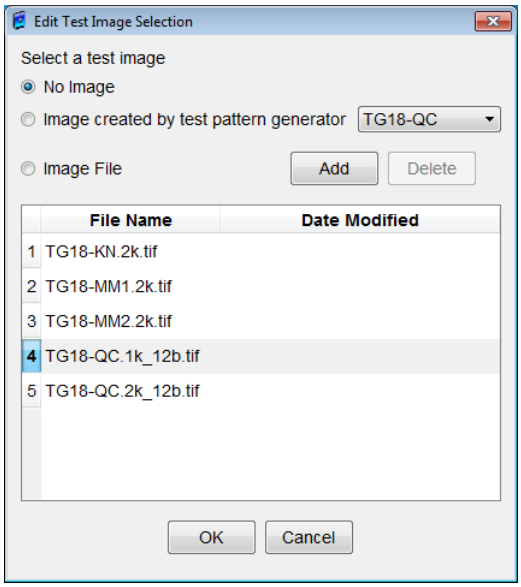

Figure 84: Edit Test Image Selection dialog box

- **No Image** radio button

Click to select no image.

- **Image created by test pattern generator** radio button

Select an image file from those in the listbox on the right.

- **Image File** radio button

The list of file names below the dialog is a list of visual test images.

- **Add** button

After copying a file into the above folder and selecting it, click the **Open** button to return to Figure 84 (page 101). The file selected from the list will be added and the modify date will be displayed.

- **Delete** button

Only files in the list with a **Date Modified** can be clicked. After clicking this button, a popup window will appear confirming the deletion. Click **OK** to delete the file from the list. Click **Cancel** if you do not wish to delete it.

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7.6. Stand Alone Calibration

Stand Alone Calibration can recalibrate the display without a computer, using the integrated front sensor.

When you start the Main Screen of GammaCompMD QA Client, the results of the **Gamma Adjust** and/or the **DICOM Measurement** function inside the display**,** which were created during a Stand Alone calibration, will be imported into the database of GammaCompMD QA. You can browse and export the result of **Gamma Adjust** and **DICOM Measurement** as a report from GammaCompMD QA Client.

The following models are equipped with **Stand Alone Calibration**.

MD210C2, MD211C2, MD242C2, MD210C3, MD211C3, MD211G3, MD302C4, AVM3N2N, AVC2N1N, AVC3N1N

7.6.1. How to get the results of Stand Alone Calibration.

1) Perform **Gamma Adjust** or **DICOM Measurement**, using the OSD of the display.
   ※ Refer to the display's documentation for details.
2) Start the Main Screen of GammaCompMD QA Client.
3) You may now display the results of **Gamma Adjust** and/or **DICOM Measurement**. For how to display these results, refer to **7.2.3 Calibration Reports** (page 56) and **7.3.3 Conformance Test Reports** (page 85). The Model name and the serial number are used as the 'Operator Name'.

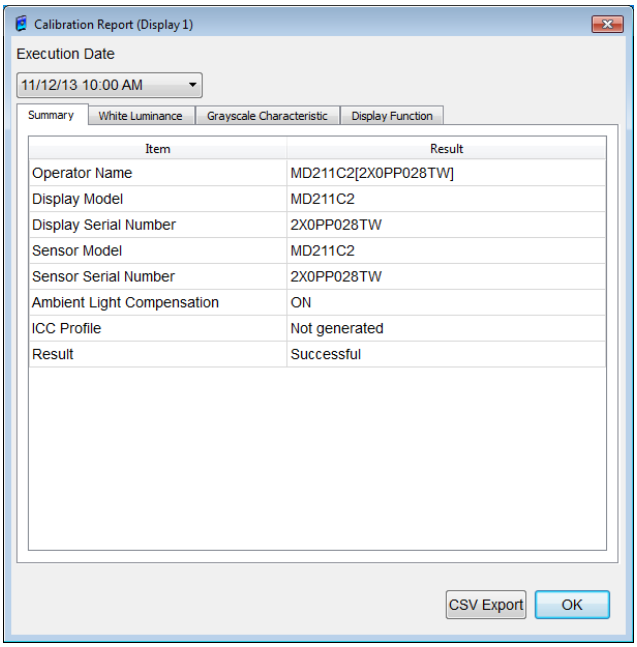

Figure 85: The result of Gamma Adjust

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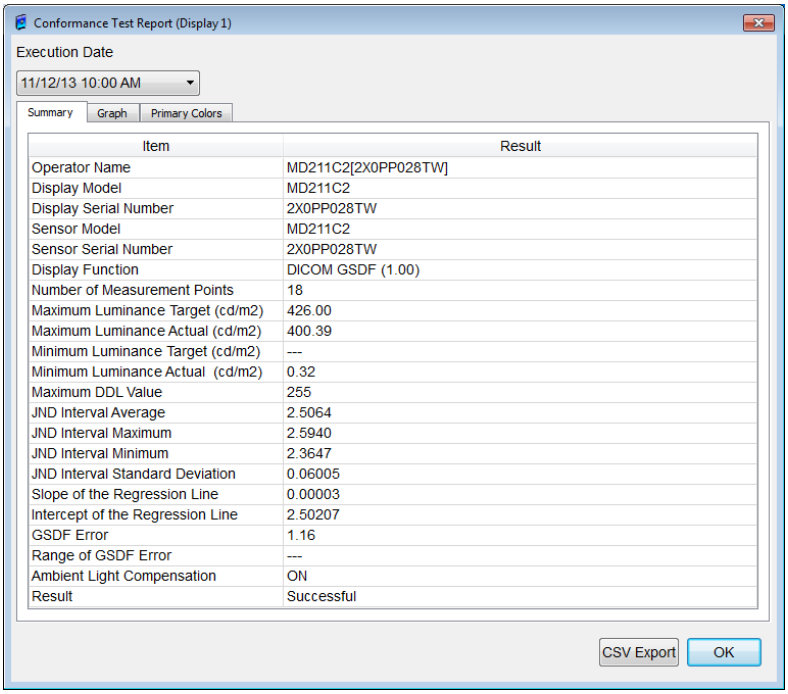

Item	Result
Operator Name	MD211C2[2X0PP028TW]
Display Model	MD211C2
Display Serial Number	2X0PP028TW
Sensor Model	MD211C2
Sensor Serial Number	2X0PP028TW
Display Function	DICOM GSDF (1.00)
Number of Measurement Points	18
Maximum Luminance Target (cd/m2)	426.00
Maximum Luminance Actual (cd/m2)	400.39
Minimum Luminance Target (cd/m2)	---
Minimum Luminance Actual (cd/m2)	0.32
Maximum DDL Value	255
JND Interval Average	2.5064
JND Interval Maximum	2.5940
JND Interval Minimum	2.3647
JND Interval Standard Deviation	0.06005
Slope of the Regression Line	0.00003
Intercept of the Regression Line	2.50207
GSDF Error	1.16
Range of GSDF Error	---
Ambient Light Compensation	ON
Result	Successful

Figure 86: The result of DICOM Measurement

Using this function:

If you want to enable this function, the following actions are required:

(1) Unzip the GammaCompMD QA package into a local or network hard disk folder, from where the installation will be started.

(2) Open the StandaloneCalibration.ini file in the same folder as the installer **setup.exe** with a text editor.

(3) Change the value of the line StandAloneCalibration=0 into StandAloneCalibration=1 and save the file.

(4) Install GammaCompMD QA.

This function can be enabled or disabled only at the time of installation.

If you want to disable this function again, the following actions are required:

(1) If required, do a Backup of all data before you uninstall GammaCompMD QA.

(2) Uninstall GammaCompMD QA.

(3) Open the StandaloneCalibration.ini file in the same folder as the installer **setup.exe** with a text editor.

(4) Change the value of the line StandAloneCalibration=1 into StandAloneCalibration=0 and save the file.

(5) Re-install GammaCompMD QA again. If required, restore the data after re-installation.

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NOTES:

- Do not perform a **Stand Alone Calibration** when you are using the Main Screen of GammaCompMD QA Client at the same. The results may be corrupted.

- If the Stand Alone Calibration has a timestamp which is newer than the system time, a warning dialog (**Figure 87**) is displayed when the Main screen of GammaCompMD QA Client is opening. The results of the **Stand Alone Calibration** cannot be imported. Repeat the **Stand Alone Calibration** and enter the correct time.

- When **Gamma Adjust** is performed**,** both the result of the **Gamma Adjust** and the result of **the DICOM Measurement** are imported into the database of GammaCompMD QA. When **DICOM Measurement** is performed, only the result of the **DICOM Measurement** is imported.

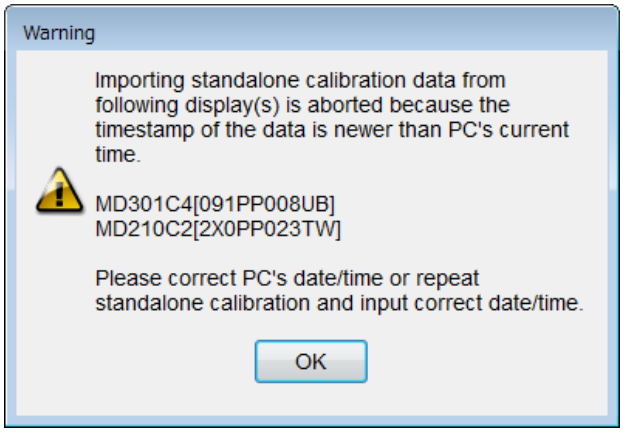
Warning
Importing standalone calibration data from following display(s) is aborted because the timestamp of the data is newer than PC's current time.
MD301C4[091PP008UB]
MD210C2[2X0PP023TW]
Please correct PC's date/time or repeat standalone calibration and input correct date/time.
OK

Figure 87: Warning Dialog

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7.7. Administrator

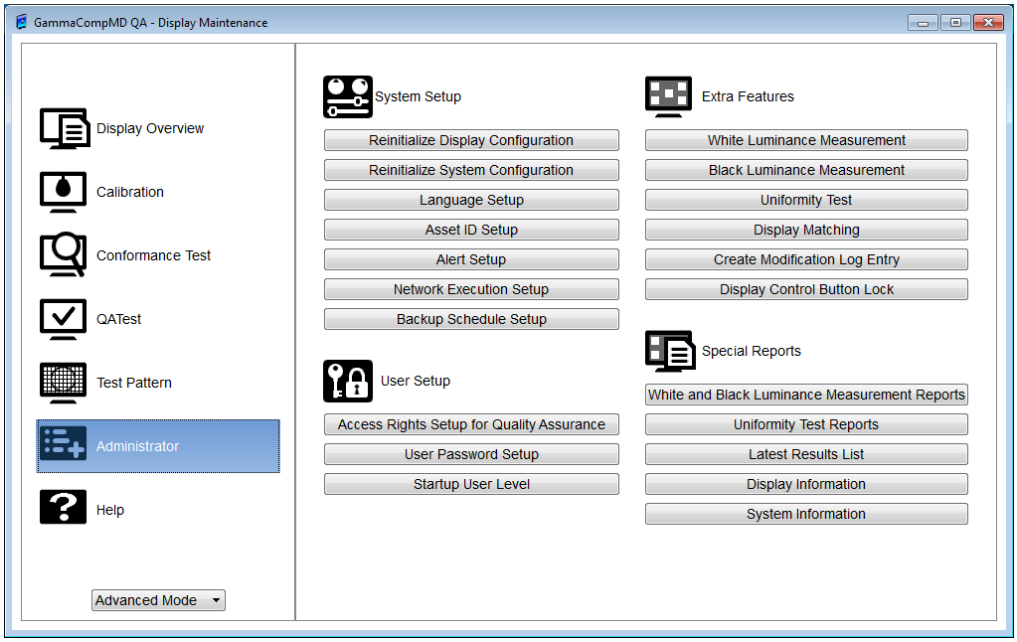

Figure 88: Administrator screen

7.7.1. System Setup

7.7.1.1. Re-initialization of Display Configuration

In **Figure 89**, the **Initialize Display Configuration** dialog box is displayed. Confirm that the display arrangement and the display interface mode are set properly.

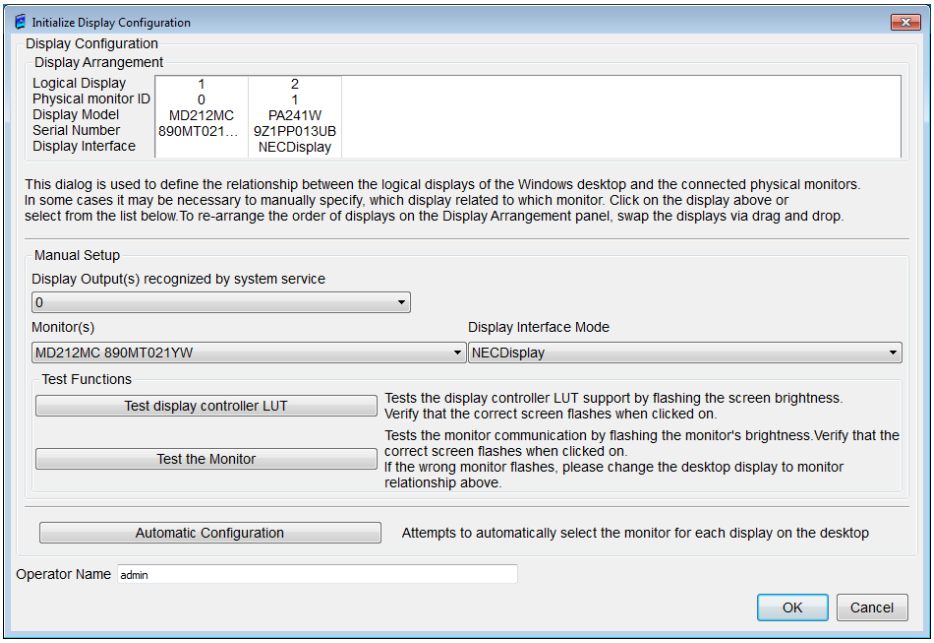
Initialize Display Configuration
Display Configuration
Display Arrangement
Logical Display 1 2
Physical monitor ID 0 1
Display Model MD212MC PA241W
Serial Number 890MT021... 9Z1PP013UB
Display Interface NECDisplay
This dialog is used to define the relationship between the logical displays of the Windows desktop and the connected physical monitors.
In some cases it may be necessary to manually specify, which display related to which monitor. Click on the display above or
select from the list below.To re-arrange the order of displays on the Display Arrangement panel, swap the displays via drag and drop.
Manual Setup
Display Output(s) recognized by system service
0
Monitor(s)
MD212MC 890MT021YW
Display Interface Mode
NECDisplay
Test Functions
Test display controller LUT
Tests the display controller LUT support by flashing the screen brightness.
Verify that the correct screen flashes when clicked on.
Test the Monitor
Tests the monitor communication by flashing the monitor's brightness.Verify that the
correct screen flashes when clicked on.
If the wrong monitor flashes, please change the desktop display to monitor
relationship above.
Automatic Configuration
Attempts to automatically select the monitor for each display on the desktop
Operator Name admin
OK
Cancel

Figure 89: Initialize Display Configuration dialog box

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Display Arrangement The displays shown in **Display Arrangement** may be dragged and dropped - always from left to right - to change the display arrangement. Use this method to re-arrange the logical display configuration in order to match the physical display arrangement on the work desk.

Display Interface Mode

This is used to classify each display. Three **Display Interface Modes** are available:

- **NECDisplay:** A NEC display which is fully managed and targeted for calibration.
- **StdDisplay:** Other displays where measurements are possible but calibration is not possible.
- **NAVDisplay:** Other displays like a Navigation/Admin/RIS monitor of a PACS system. This type of monitor is not selectable for any action at all.

Change the **Display Interface Mode** within the **Manual Setup** area in the following sequence:
(1) Select the display targeted for change in the **Display Output(s) recognized by system service** pull-down menu.
(2) Change the Display Interface Mode according to your requirements.
Repeat these steps for subsequent displays and confirm the correct assignment of the **Display Interface Mode** to each display in the **Display Arrangement** area.

Automatic Configuration If the **Display Arrangement** was changed and therefore the relation with the **Display Output(s) recognized by system service** was changed, problems may occur with measurements on the correct target display. If this was changed unintentionally, an **Automatic Configuration** may help to correct this situation. By clicking the **Automatic Configuration** button, the displays currently connected, and their **Physical Monitor ID** are automatically detected, and the appropriate display interface mode is set.

NOTE: Automatic Configuration will follow the arrangement as detected by Windows. In case of a non-standard display arrangement in Windows, as shown in **Figure 90**, a **Manual Setup** is required to match the logical display configuration with the physical display arrangement on the work desk.

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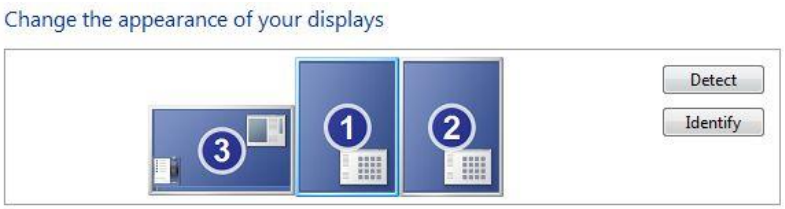

Figure 90: Example of a non-standard Display Arrangement in Windows

NOTE: If Asset IDs were entered for the previously connected displays, these will be re-initialized. The Asset ID field for each display in the **Display Information Area** is shown blank.

OK button Saves the settings and closes the dialog box. If no **Operator Name** is entered, this button is inactive.

Cancel button Closes the dialog box without saving any settings.

- **Test Functions**

▪ **Test display controller LUT**

There are occasions when the **Logical Display** and the **Physical Monitor ID** are switched with Windows identification, specifically with dual display controller arrangements, as shown in the example in **Figure 90**. In such cases, the measurement and calibration operations may not be performed on the correct target display, and proper results cannot be achieved.
Use the following steps to confirm the correct display connection:
Step (1): Select the ID number in **Display Output(s) recognized by system service.**
Step (2): Select the target display in **Monitor(s).**
Step (3): Click the **Test Display Controller LUT** button in the **Test Functions** area, and confirm that the display which was selected in step (2), reduces brightness for a moment. The **Test Display Controller LUT** function is only applied on the selected display.

▪ **Test the Monitor**

Now click the **Test the Monitor** button and confirm that the display, which was selected in step (2), slowly reduced brightness, and then comes back to normal. The **Test the Monitor** function is performed on the **Display Output(s) recognized by system service** selection.
If the tested **NECDisplay** displays are the same as selected with step (2) in both tests, then the change was successful. Enter the **Operator Name** and click **OK.**
If however the tested **NECDisplay** displays were different in both tests, then the change was not successful. Perform these again with step (1).

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In case of confusion, the **Automatic Configuration** feature may be used to restore the original settings and then to start the tests again with a defined display arrangement.

NOTE: The **Automatic Configuration** function cannot detect whether one of the connected displays is the Navigation or RIS monitor of a PACS system. Any display which cannot be detected as a **NECDisplay** will automatically be shown as a **NAVDisplay.**

However, it may be helpful to manually change the **Display Interface Mode** for a third party display to **StdDisplay** within this **Initialize Display Configuration** process, in order enable functions like DICOM conformance tests or QA tests.

7.7.1.2. Reinitialize System Configuration

When **Reinitialize System Configuration** is clicked in **Administrator**, the Information dialog box, as shown in **Figure 91**, is displayed. (Local) System Administrator access rights are required to initialize the system configuration.

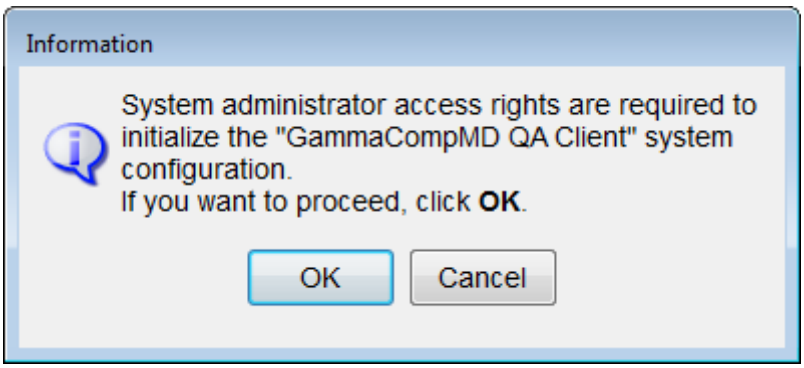
Information
System administrator access rights are required to initialize the "GammaCompMD QA Client" system configuration.
If you want to proceed, click OK.
OK
Cancel

Figure 91: Information dialog box

Clicking the OK button will either display a confirmation dialog box reminding about system administrator access rights, or a dialog box for raising the access rights level, depending on the operating system. Follow the instructions to complete this step. Then the **Initialize System Configuration** dialog box, as shown in **Figure 92**, will be displayed.

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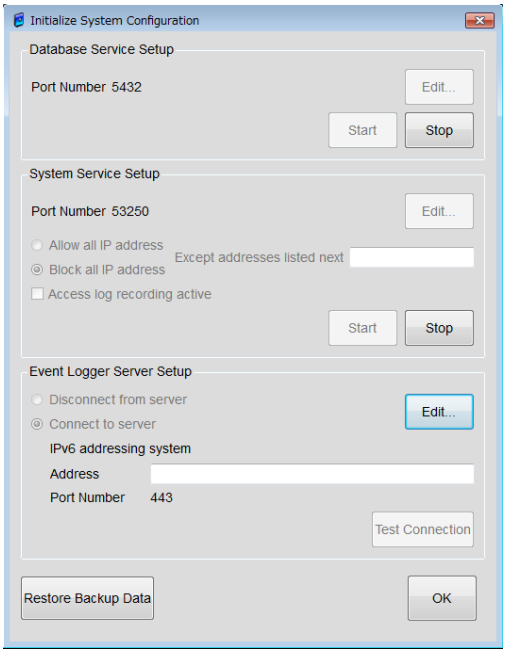

Figure 92: Initialize System Configuration dialog box

This dialog box is used to set up **Database Service**, **System Service** and **Event Logger Server** as well as to restore database content that was backed up when the **GammaCompMD QA Client** system was un-installed. Starting **System Service** also enables a connection to be established with **GammaCompMD QA Server** via network.

Database Service Setup

Any change of the port number for the Database service - called GCMDQADBService - is made here. The sequence of operation for a port number change is: **Stop** → **Edit** → **Start**.

Use the **Database Service Setup** dialog box shown in **Figure 93** to change the port number.

- **Edit** button

Click on the **Edit** button to display the Database Service Setup dialog box, as shown in **Figure 93**.

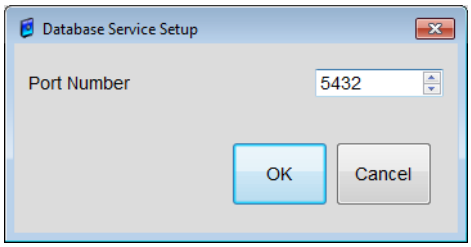

Figure 93: Database Service Setup dialog box

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- **Start** button

Click on the **Start** button to start the GCMDQA Database Service.

- **Stop** button

Click on the **Stop** button to stop the GCMDQA Database Service.

NOTE: The Database system service restarts operation when **Start** is clicked in the **Initialize System Configuration** dialog box. The value shown in **Figure 92** was initially defined during installation of **GammaCompMD QA client**. The main reason to change this port number is to avoid conflicts with other applications using the same port number on the same system or network.

System Service Setup The system service referred to is called GCMDQA Engine Service. This system service communicates with both the GammaCompMD QA Client application on the local system and an active GammaCompMD QA Server in the same network. The sequence of operation to set up or change this service is: **Stop** → **Edit** → **Start**. All system service setting changes are performed with the **System Service Setup** dialog box, as shown in **Figure 94.**

- **Edit** button

Click the **Edit** button to display the System Service Setup dialog box, as shown in **Figure 94**.

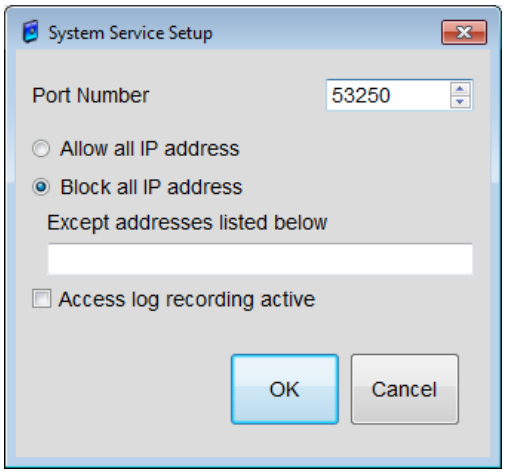

Figure 94: System Service Setup dialog box

- **Allow All IP Addresses**

  If **Allow All IP Addresses** is selected, access is allowed from all addresses other than those specified as exception addresses.

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- **Block All IP Addresses**
  If **Block All IP Addresses** is selected, access is blocked from all addresses other than those specified as exception addresses.
- **Except addresses listed below**
  Enter any IP address exceptions to the selected rule.

NOTES:

- When **Allow All IP Addresses** is selected, any IP address exceptions are not allowed.
- When **Block All IP Addresses** is selected, any IP address exceptions are allowed.
- Valid IP address exceptions are: Individual IP Version 4 addresses, IP Version 4 wildcard address, IP Version 6, NetBIOS names or Windows host names. Multiple specifications are possible when separated by commas. IP addresses must not contain any leading zeros (0).
- When you select "Block all IP address" on the IPv6 addressing system which do not have temporary IPv6 address, Enter the all available IPv6 address include Link-Local address on the "Except addresses listed next" field.
- Select "Allow all IP addresses" on the IPv6 addressing system which have a temporary address.
- **IP address examples:**
  (1) Incorrect IPv4 address entry: “010.125.172.029”, correct entry: “10.125.172.29”.
  (2) IPv4 wildcard addresses: “192.168.4.*”, “10.125.*”.

- **Access log recording active**
  If this box is checked, an access log is stored in the GammaCompMD QA database.

- **Start** button

Click on the **Start** button to start the QCMDQA Engine Service.

- **Stop** button

Click on the **Stop** button to stop the QCMDQA Engine Service.

NOTE: The system service restarts operation when **Start** is clicked in the **Initialize System Configuration** dialog box. The settings shown in **Figure 94** were initially defined during installation of **GammaCompMD QA Client**. The main reason to change IP address settings is to connect the **GammaCompMD QA Client** with a **GammaCompMD QA Server** within the actual network installation.

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Setting Up the Event Log Server

Event logs may be transmitted to the **GammaCompMD QA Server**, such as events specified for alerts or completion notices. These settings are made with the **Event Log Server Setup** dialog box, as shown in **Figure 95**.

- **Edit** button

Click on the Edit button to display the Event Logger Server Setup dialog box, as shown in **Figure 95**.

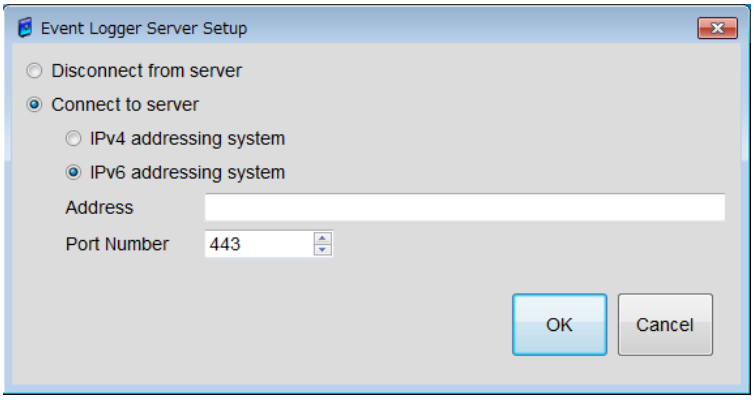

Figure 95: Event Logger Server Setup dialog box

- **Disconnect from Server**

  If selected, **GammaCompMD QA Client** does not connect to the server for the Event Logger Server.

- **Connect to Server**

  If selected, **GammaCompMD QA Client** connects to the server for the Event Logger Server. If **Connect to Server** is selected then it is possible to specify addresses and port numbers. Select IPv4 addressing system or IPv6 addressing system.

- **Address**

  Specifies the IP address of the server. Valid IP addresses are: The server's IP Version 4 address, IP Version 6 address, a NetBIOS name or Windows host name. An IP address must not contain any leading zero (0).
  Do not input a temporary IPv6 address.

- **Port Number**

  To specify the port number of the Event Logger Server

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- **Test Connection** button

After the data below **Connect to server** set up in the **Event Logger Server Setup** dialog box and confirmed with OK, the **Initialize System Configuration** dialog box, as shown **Figure 92** returns. Click on the **Start** button to start the System Service. After the system service is running, the **Test Connection** button is used to confirm the communication with the Event Logger Server part of the **GammaCompMD QA Server**. The button cannot be clicked if **Disconnect from Server** is selected or if no address has been entered.

NOTE: If the connection test was successful a success message will be shown. If the connection test is not successful, please wait at least for two minutes until the connection test times out and returns with an error message.

NOTE: All Port address (number) settings, as shown in **Figure 95**, were initially defined during installation of **GammaCompMD QA Client**.

Restore Backup Data **Restores history data, which was either:**

Backed up during a scheduled backup or A database backup during un-installation of **GammaCompMD QA Client**.

When **Restore Backup Data** is clicked, the **Select a backup file to be restored** dialog box, as shown in **Figure 96**, is displayed.

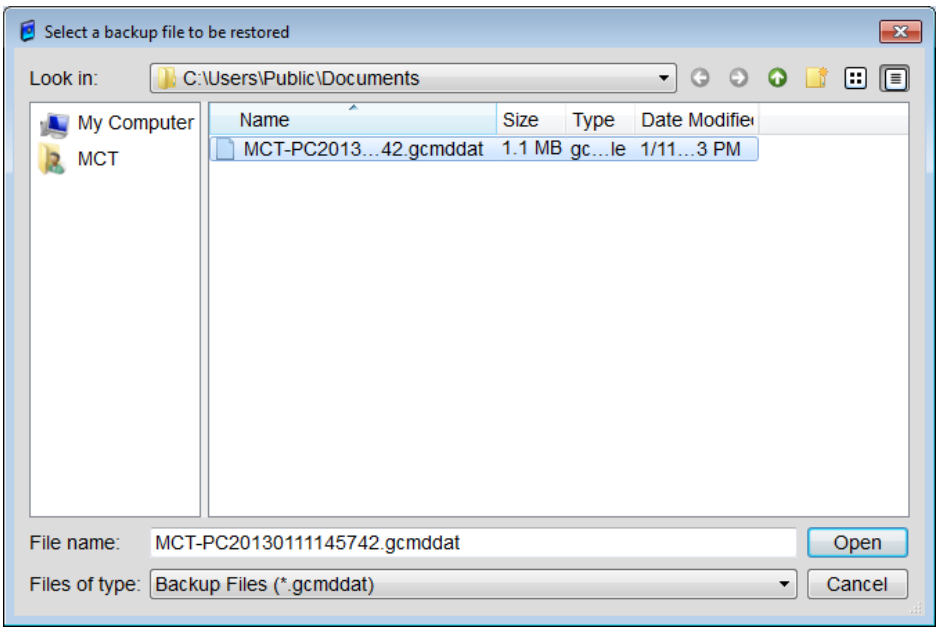

Figure 96: Select a backup file to be restored dialog box

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When the file to be restored is selected in this dialog box and the **Open** button at the bottom right is clicked, a **Restoring Backup Data…** popup window is displayed until the restore process is completed.

NOTE:
Perform 7.7.1.1**Re-initialization of Display** Configuration (page 105) after restoration.

- **Open** button

Close the dialog box. The main window is closed at this time and the taskbar icon will disappear, please opens the main screen again.

7.7.1.3. Language Setup

Click **Language Setup** in **Administrator** to display Figure 97.

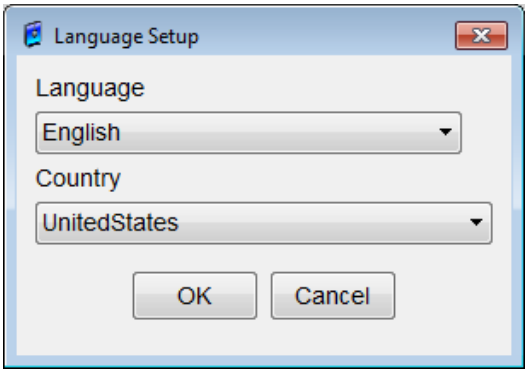

Figure 97: Language Setup dialog box

Language — Six languages are available: English, Japanese, German, French, Italian and Spanish.

Country — Select your country from the listbox. The [**Date and time formats**], as well as [**Numbers**] format, as set in Windows [**System Locale**] will be used in GammaCompMD QA Client.

Cancel button — Closes the dialog box without changing any language or country settings

OK button — Closes the dialog box and applies the language and country selected. The **Information** dialog box will be displayed when the dialog box closes (Figure 98).

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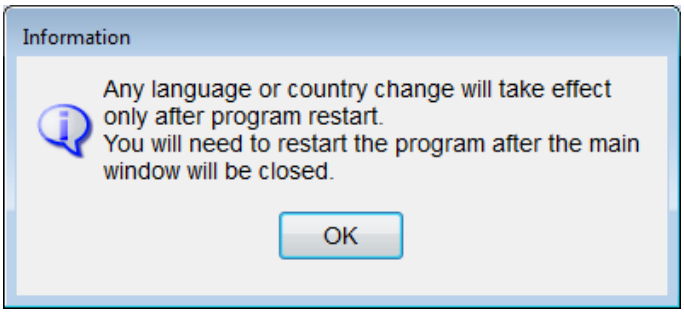
Information
Any language or country change will take effect only after program restart.
You will need to restart the program after the main window will be closed.
OK

Figure 98: Information dialog box

Clicking the OK button will close the main window and the taskbar icon will also disappear. You will need to reopen the main window, see **5.1 Start-up and shutdown of GammaCompMD QA Client** (page 44).

NOTE: The Information dialog box will be displayed even if no changes were made to the language or country settings.

7.7.1.4. Asset ID Setup (Optional)

When **Asset ID Setup** is clicked in **Administrator**, the **Asset ID Setup** dialog box, as shown in **Figure 99**, is displayed. This dialog box may be used to enter a unique asset ID of the display for asset management purposes.

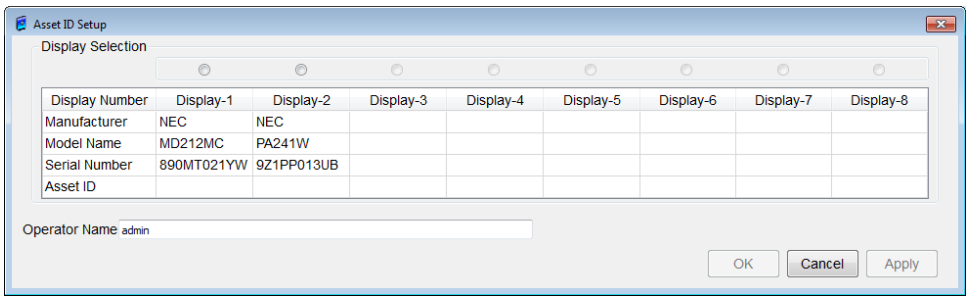

Figure 99: **Asset ID Setup dialog box**

Display Selection — Select the display, one at a time, by clicking the radio buttons above the display numbers. A cursor is then displayed in the **Asset ID** input field at the same time. If no asset ID is set, this field will be blank.

Asset ID input field — Enter an ID in the Asset ID field of the selected display. Any ID consisting of a maximum of 12 upper case or lower case alphanumeric characters can be created.

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NOTE: As no duplicate check is performed for asset IDs, the same ID may be used for multiple displays such as using a group name. However, care should be taken, since it will be more difficult to distinguish these IDs in log information which is collected by the **GammaCompMD QA server**.

OK button	Saves any changes and closes the dialog box. The **OK** button cannot be clicked unless the **Operator Name** is entered.
Cancel button	Closes the dialog box without saving any setting. However, any changes that were applied by clicking the **Apply** button cannot be returned to their previous state.
Apply button	Applies any changes but does not close the dialog box. The **Apply** button cannot be clicked unless the **Operator Name** is entered.

7.7.1.5. Alert Setup

This dialog box is used to set error limits for measured values compared to predefined target values. You can also select whether to issue an alert (warning) when a preset limit is exceeded during the measurement.

When **Alert Setup** is clicked in **Administrator**, the **Alert Setup** dialog box, as shown in **Figure 100**, is displayed.

For every alert item, there is a checkbox option:

- To display a dialog box to the related display of the local workstation.
- To send alert information to the server in a GammaCompMD QA network environment when an alert is issued.

NOTE: Set the required preset values before executing a white luminance measurement, conformance test, or QA test.

Immediately after **Alert Setup** is clicked in **Administrator**, the White Luminance tab is shown. The other setup dialog boxes can be displayed by clicking the tabs where **Conformance (1)**, **Conformance (2)** and **Others** appear.

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- **Common settings for each tab**

Restore Defaults Change all alert settings to their default values. Also uncheck all **Send to client workstation** checkboxes.

Apply to same display models

When operating a system with multiple connected displays of the same model, clicking this button copies the values that were set for the selected display to the other displays of the same model.

OK button Saves the settings and closes the dialog box. The **OK** button cannot be clicked unless the **Operator Name** is entered.

Cancel button Cancels the settings and closes the dialog box. However, any setting that was applied by clicking the **Apply** button cannot be returned to its previous state.

Apply button Saves the settings but does not close the dialog box. The **Apply** button cannot be clicked unless the **Operator Name** is entered.

- **White Luminance** tab

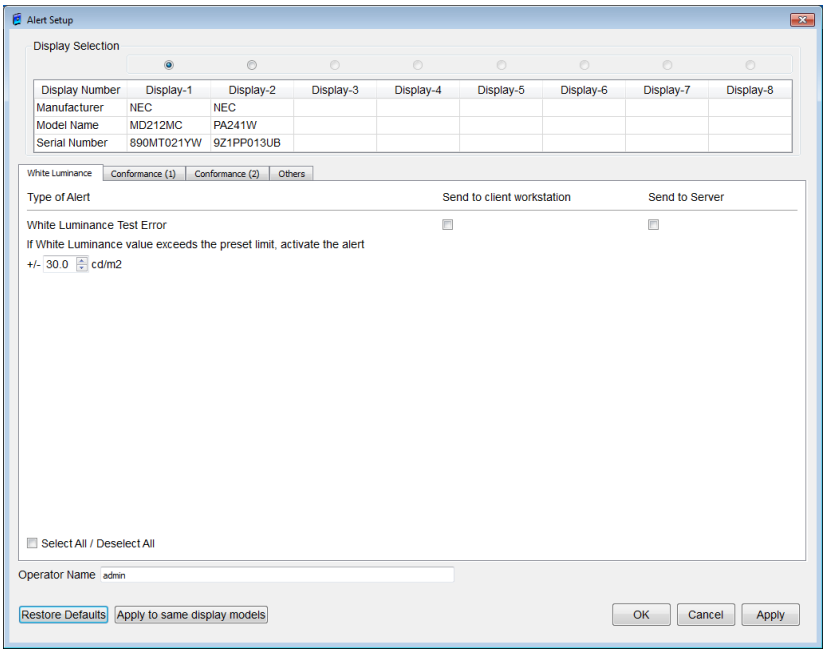

Figure 100: Alert Setup dialog box

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White Luminance Test Error

Define the maximum deviation from the target value when the White Luminance value is measured. The target luminance value for white luminance calibration is used as the target value. The maximum deviation can be set in a range from +/-10.0 cd/m^2 to +/-100.0 cd/m^2.

Send to client workstation

To display a dialog box on the selected display when the preset limit is exceeded during measurement, check this checkbox.

Send to Server Check this box to send an alert to the GammaCompMD QA Server when the preset limit is exceeded during measurement.

Select All/Deselect All **Select or deselect all tick boxes for both** Send to client workstation **and** Send to Server.

- **Conformance (1)** tab

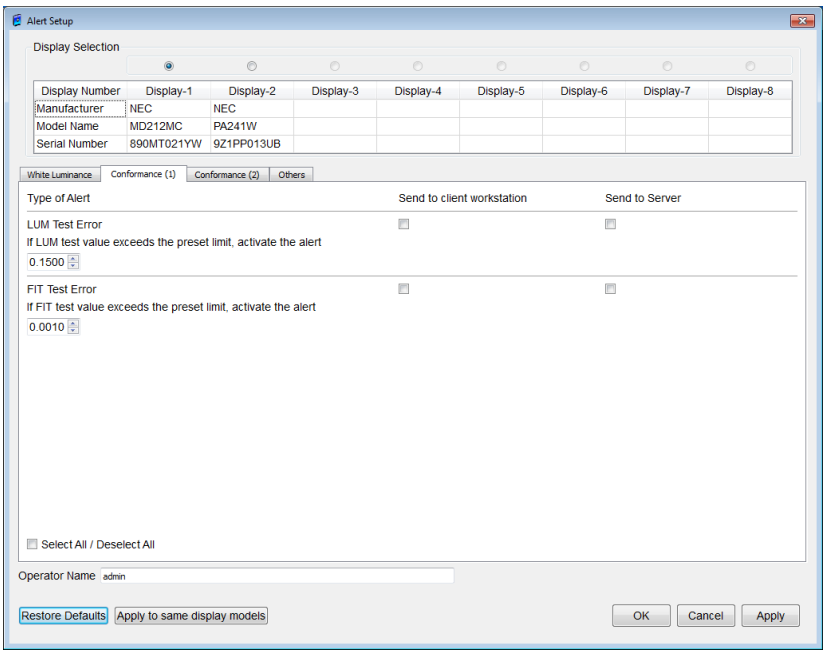

Figure 101: Alert Setup – Conformance (1) dialog box

LUM Test Error Define the maximum permissible value for the standard deviation of the JND-Index intervals, which is back calculated from the luminance characteristics after grayscale calibration. This can be set in a range from 0.0001 to 0.9900.

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FIT Test Error Define the maximum permissible range for the slope of the straight line that was calculated when executing a linear regression analysis for the JND-Index interval data, which is back calculated from the luminance characteristics after grayscale calibration. This can be set in a range from 0.0001 to 0.9900.

Send to client workstation

To display a dialog box on the selected display when the preset limit is exceeded during measurement, check this checkbox.

Send to Server Check this box to send an alert to the GammaCompMD QA Server when the preset limit is exceeded during measurement.

Select All/Deselect All **Select or deselect all tick boxes for both** Send to client workstation **and** Send to Server.

- **Conformance (2)** tab

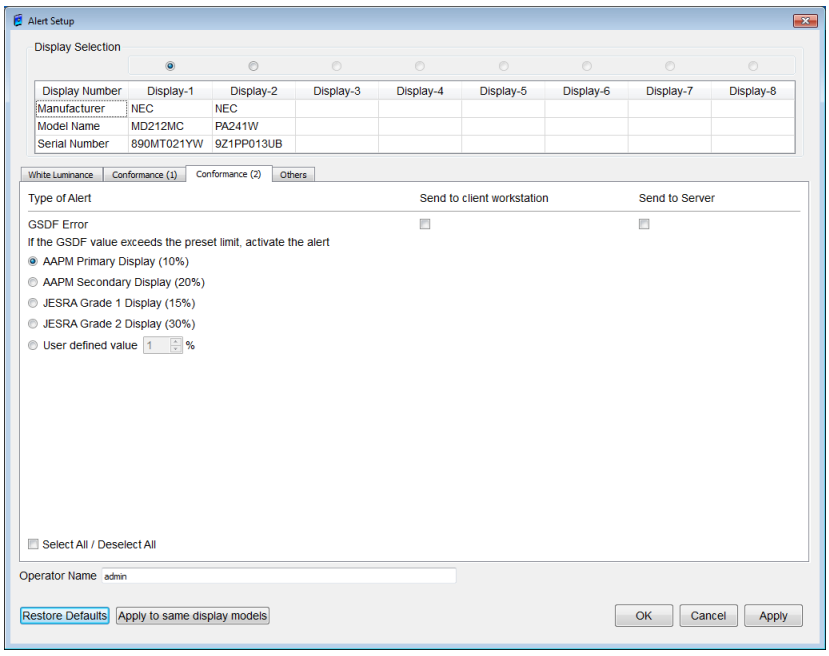

Figure 102: Alert Setup – Conformance (2) dialog box

GSDF Error (If the GSDF value exceeds the preset limit, activate the alert)

Define the reset limit when the conformance test is performed. If **User defined value** is selected, the preset limit can be selected or entered.

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- **AAPM Primary Display (10%)**
- **AAPM Secondary Display (20%)**
- **JESRA Grade 1 Display (15%)**
- **JESRA Grade 2 Display (30%)**
- **User defined value:** This can be set in a range from 1% to 50%

Send to client workstation

To display a dialog box on the selected display when the preset limit is exceeded during measurement, check this checkbox.

Send to Server Check this box to send an alert to the GammaCompMD QA Server when the preset limit is exceeded during measurement.

Select All/Deselect All **Select or deselect all tick boxes for both** Send to client workstation **and** Send to Server.

- **Others** tab

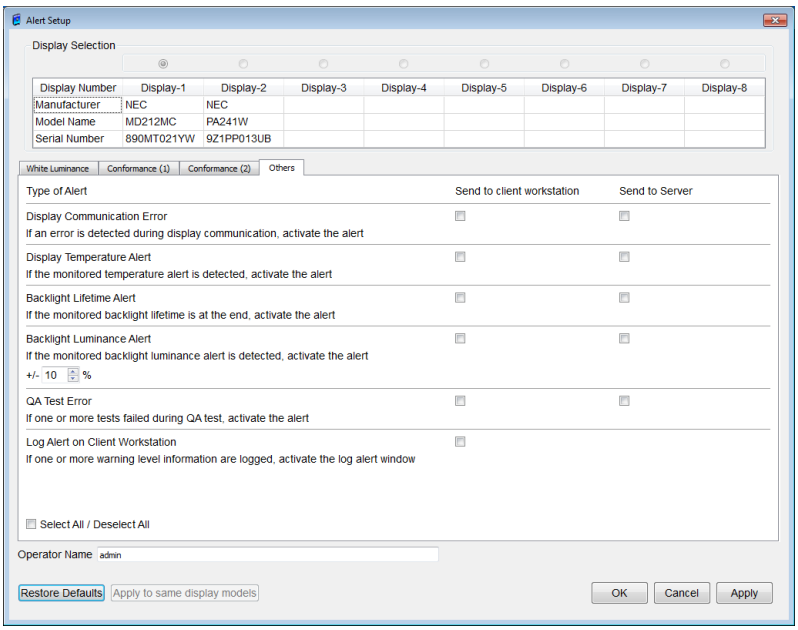

Figure 103: Alert Setup – Others dialog box

When the **Others** tab is clicked, the Alert Setup – Others dialog box, as shown in **Figure 103**, is displayed. This dialog box is used to select those alerts which need to be activated on all connected displays when a preset value is exceeded and an alert is activated.

NOTE: These settings apply to all displays and therefore a single display cannot be selected.

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Display Communication Error

Activates an alert when an error is detected while communicating with the display. To ignore the alert, uncheck the Send to client workstation checkbox.

Display Temperature Alert

Activates an alert when an abnormal temperature is detected during routine monitoring. To ignore the alert, uncheck the Send to client workstation checkbox.

Backlight Lifetime Alert Activates an alert when an abnormal expected backlight lifetime is detected during routine monitoring. To ignore the alert, uncheck the Send to client workstation checkbox.

Backlight Luminance Alert

Activates an alert when an abnormal backlight luminance is detected during routine monitoring. A value from 0 to +/- 50(%) can be entered. To ignore the alert, uncheck the Send to client workstation checkbox.

QA Test Error Activates an alert when a failure is detected in a QA test. To ignore the alert, uncheck the Send to client workstation checkbox.

Log Alert on Client Workstation

Displays a log alert popup window when a warning level log entry is created. To ignore the alert, uncheck the Send to client workstation checkbox.

Send to client workstation

To display a dialog box on the selected display when the preset limit is exceeded during measurement, check this checkbox.

Send to Server Check this box to send an alert to the GammaCompMD QA Server when the preset limit is exceeded during measurement.

Select All/Deselect All Select or deselect all tick boxes for both **Send to client workstation** and **Send to Server.**

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NOTE: When multiple alerts in the **Alert Setup - Others** dialog box are activated at the same time, only the alert that was activated first is shown in the **GammaCompMD QA Client** Main Menu. To check whether multiple alerts were activated, refer to **10 Log Viewer** (page 153).

7.7.1.6. Network Execution Setup

Click **Network Execution Setup** in **Administrator** to display the **Network Execution Setup** dialog box, see **Figure 104**. This shows the status of network requests sent from the **GammaCompMD QA** server and can be used to suspend execution of tests. The network executions can only work with **Display sensors** (integrated front sensors or retractable sensors). An **External sensor** cannot be used.

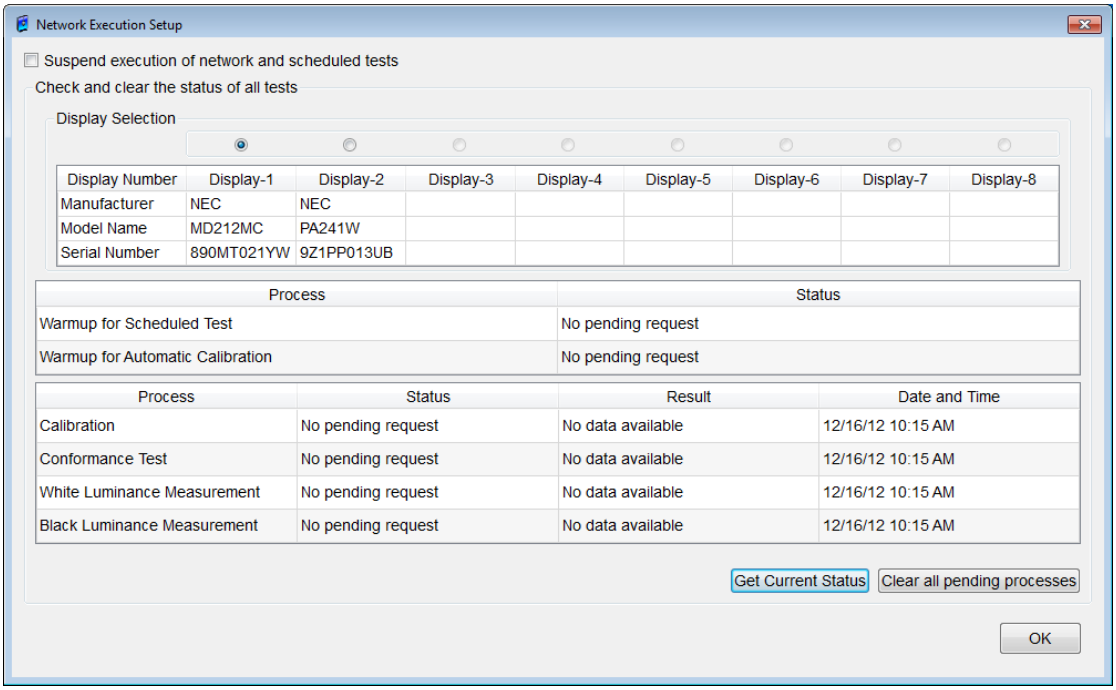

Figure 104: Network Execution Setup dialog box

Suspend execution of network and schedule tests

When this box is checked, no scheduled tests or network tests will be performed. They will be resumed when the box is unchecked.

NOTE: Scheduled tests will be performed when no user is logged into the system

Display selection Check the box above a display to select the display. Only one display is selectable at a time.

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Process, Status and Result

The Status column shows the status of each display. See **Guide to Status Information and Results** for information on the types of statuses and results that can be displayed. Status information is listed for the following processes. Results, date and time are shown:

- **Warm-up for Scheduled Test**
- **Warm-up for Automatic Calibration**
- **Calibrations**
- **Conformance Test**
- **White level measurement**
- **Black level measurement**

Status Information	**Explanation**
No execution command	No execution command was provided.
Command suspended	When it was time for the scheduled test to start, either the **Display Maintenance** or **Quality Assurance** or **Visual Test** main menu was active. Or, when at time for the scheduled test to start, the box to **Suspend execution of network and schedule tests** was checked. If Windows 8/ 8.1, is used, the Start Menu or Windows Store Apps is active.
Command postponed	The operation was suspended by the user.
Successful	The command was executed successfully. This refers to an execution instruction being provided successfully, but does not mean that the activity has been completed successfully.
Needs to be executed manually	The display sensor is not correctly assigned to the display, and/or an external sensor has been selected.
Command cancelled	The operation was cancelled.
Command completed with errors	The operation failed.
No Data	Execution of the process has not been

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Status Information	Explanation
	completed. This message is also displayed, when the **Clear Pending Processes** button was clicked.

OK button Closes the dialog box.

Get Current Status Shows latest status for the display selected.

Clear all pending processes

For pending processes, scheduled tests postponed by the user will be shown. These can be cleared by clicking this button. The date and time will change as the statuses are updated internally.

NOTE: The **Result** column also reflects execution of commands by **GammaCompMD QA Client** (Calibrations, etc.), when the system is not connected to **GammaCompMD QA Server**.

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7.7.1.7. Backup Schedule Setup

Click **Backup Schedule Setup** in **Administrator** to display the **Backup Schedule Setup** dialog box (**Figure 105**). This function is used to back up the database. This database contains **GammaCompMD QA Client** setup and calibration, QA test reports and schedule entries, which will be backed up.

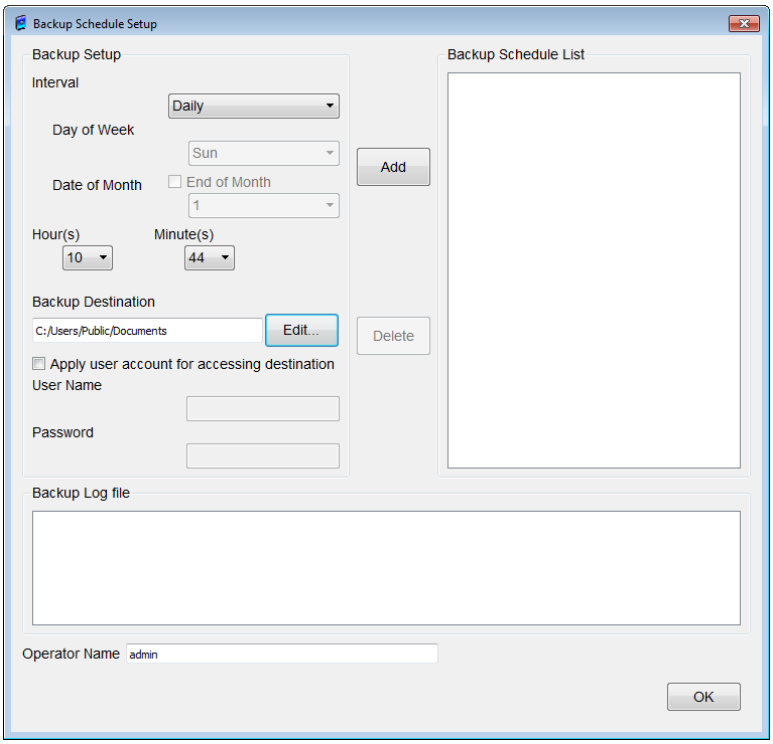

Figure 105: Backup Schedule Setup dialog box

Backup Setup

- **Interval**

Set the frequency of backup execution (Daily, Weekly or Monthly).

- **Day of Week**

Set the day of the week on which the backup will be executed. This is used when **Interval** is set as Weekly.

- **Date of Month**

Set the date of the month on which the backup will be executed. This is used when **Interval** is set as Monthly.

- **End of Month**

Sets backup to be executed on the last day of each month. This is used when **Interval** is set as Monthly. If this box is checked, Date of Month selections are not possible.

- **Hour(s), Minute(s)**

Set the time at which the backup will be executed. This can be set with any **Interval** setting.

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- **Backup Destination**

Indicate the directory (local or on a network disk) to which the backup file will be saved. The following is set as the Default destination when the program is installed.

- ***Windows XP:***
  C:**[Documents and Settings\ALL Users\Documents]**

- ***Windows 7 and Windows8 / 8.1:***
  C:**[Users\Public\Documents]**

To change the destination, click the Edit button. This will display the **Backup Destination** dialog box (**Figure 106**). The backup file will be saved as:
[Computer name] Year Month Day Hour Minute Second.gcmddat
(Example**:** If the computer name is Medical and the backup was done at 1**:**15**:**30pm on September 1, 2011, the file name will be MEDICAL20110901131530.gcmddat)

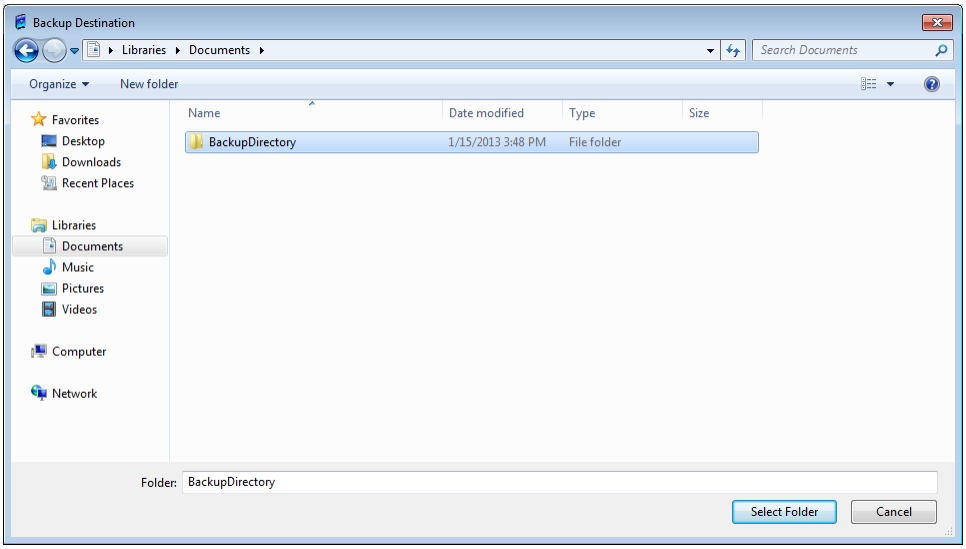

Figure 106: Backup Destination dialog box

Apply user account for Sets the destination as a network folder requiring verification. If **accessing destination** is checked, an operator name and password can be entered. The password must consist of alphanumeric characters.

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Add button	Adds the backup schedule to the list. The schedule will be shown in the **Backup Schedule List** on the right hand side of **Figure 105** (page 125). The schedule will be effective immediately upon entry in the list. This button cannot be clicked if no **Operator Name** is entered.
Delete button	Deletes a schedule from the Backup Schedule List on the right hand side of **Figure 105** (page 125)**.** Select the schedule you wish to delete from the list and click the **Delete** button to delete the schedule. Multiple schedules cannot be deleted at once.
OK button	Closes the dialog box. The **OK** button cannot be clicked if no **Operator Name** is entered.
Backup Log File	Shows backup history with **Successful** or **Failed**.

7.7.2. User Setup

7.7.2.1. Access Rights Setup for Quality Assurance

This setup is only possible when the **Display Maintenance** menu has been opened. If the **Quality Assurance** menu has been opened, the item **Access Rights Setup for Quality Assurance** will not be listed in the **Tools** menu.

Click **Access Rights Setup for Quality Assurance** in **Administrator** to display the **Access Rights Setup for Quality Assurance** dialog box, see **Figure 107.** This function can allow or prevent access to various functions in the **Quality Assurance** in **Technician** level (**Standard User** level). Access to functions can be allowed or prevented by checking or un-checking the boxes. **Figure 107** to **Figure 112**, show the checked and un-checked boxes by default when the program is installed.

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- **Main Window** tab (**Figure 107**)

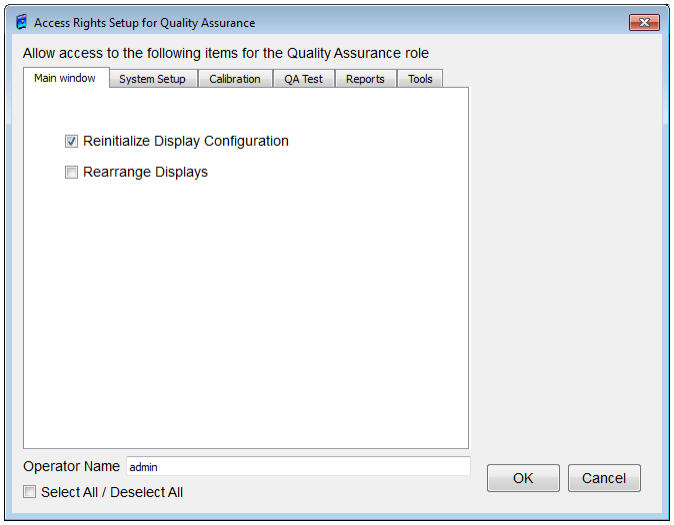

Figure 107: Access Rights Setup for Quality Assurance dialog box (Main window)

Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance -** main menu:

- Reinitialize Display Configuration
- Active Display Setup (A check box right of the display icon)

- **System Setup** tab (**Figure 108**)

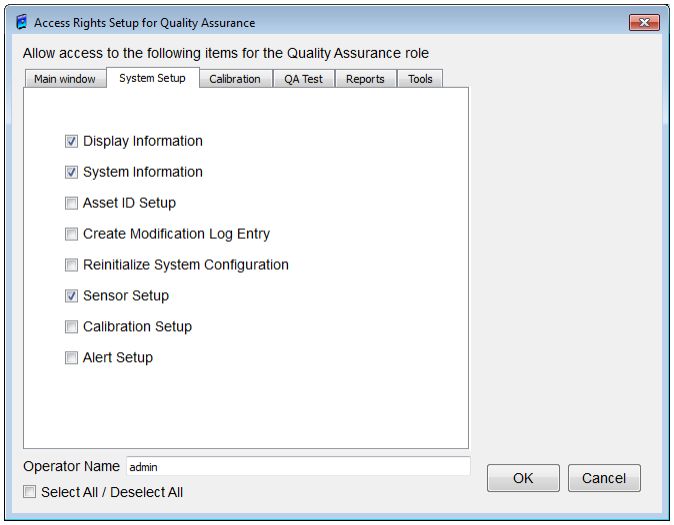

Figure 108: Access Rights Setup for Quality Assurance dialog box (System Setup)

Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance - System Setup** menu:

- Display information
- System information

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- Asset ID Setup
- Create Modification Log Entry
- Reinitialize System Configuration
- Sensor Setup
- Calibration Setup
- Alert Setup

- **Calibration** tab (**Figure 109**)

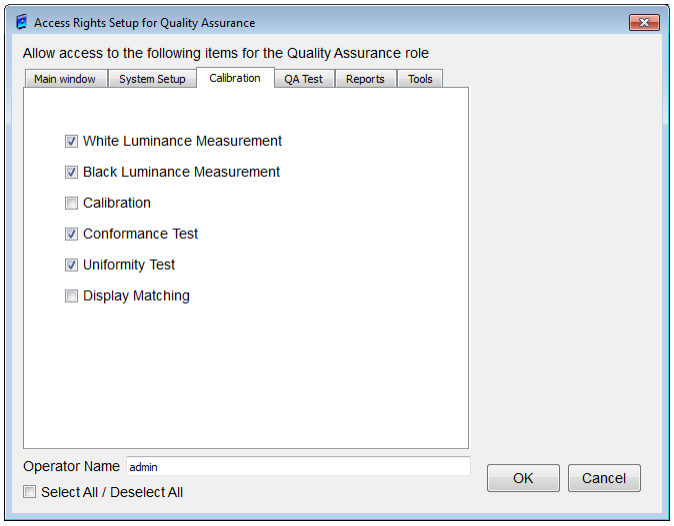

Figure 109: Access Rights Setup for Quality Assurance dialog box (Calibration)

Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance - Calibration** menu:

- White Level Measurement
- Black Level Measurement
- Calibration
- Conformance Test
- Uniformity Test
- Display Matching

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- **QA Test** tab (**Figure 110**)

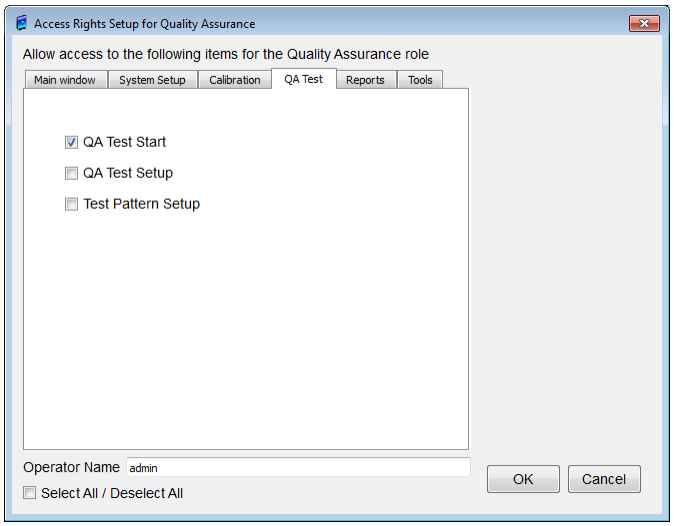

Figure 110: Access Rights Setup for Quality Assurance dialog box (QA Test)

Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance - QA Test** menu:

- QA Test Start
- QA Test Setup
- Test Pattern Setup

- **Reports** tab (**Figure 111**)
-

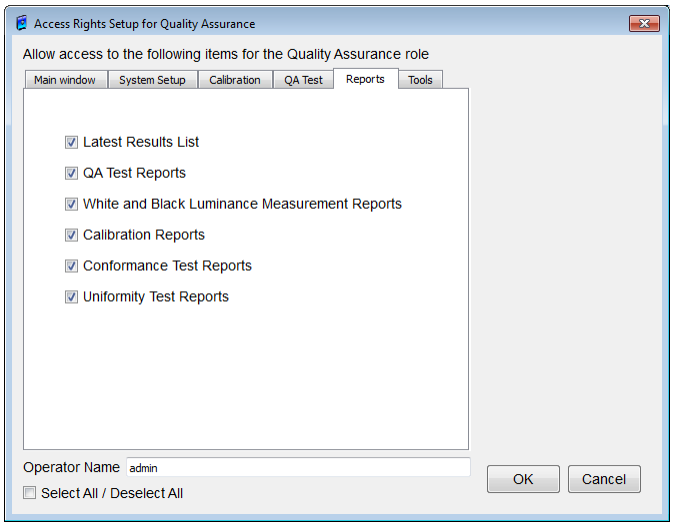

Figure 111: Access Rights Setup for Quality Assurance dialog box (Reports)

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Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance - Reports** menu:

- Latest Results List
- QA Test Reports
- White and Black Luminance Measurement Reports
- Calibration Reports
- Conformance Test Reports
- Uniformity Test Reports

- **Tools** tab (**Figure 112**)

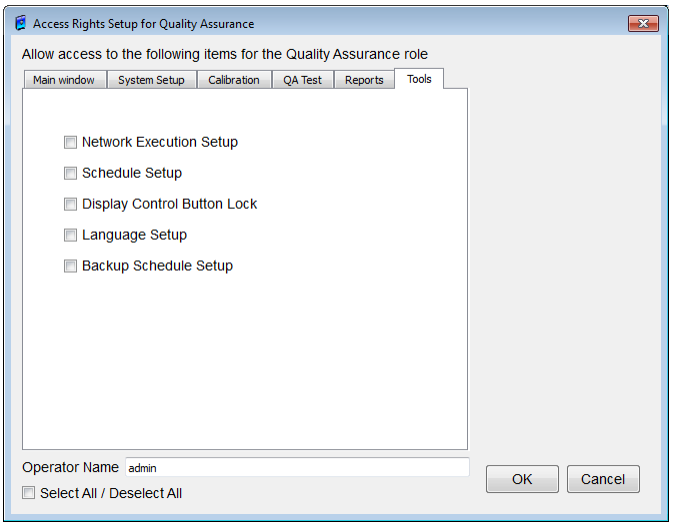

Figure 112: Access Rights Setup for Quality Assurance dialog box (Tools)

Allows or prevents access of a **Technician Mode** User to the following on the **Quality Assurance - Tools** menu:

- Network Execution Setup
- Schedule Setup
- Display Control Button Lock
- Language Setup
- Backup Schedule Setup

7.7.2.2. User Password Setup

This setup is only possible when the **Display Maintenance** menu has been opened. If the **Quality Assurance** menu has been opened, the item **User Password Setup** will not be listed in the **Tools** menu. Click **User Password Setup** in **Administrator** to display the **User Password Setup** dialog box (**Figure 113**).

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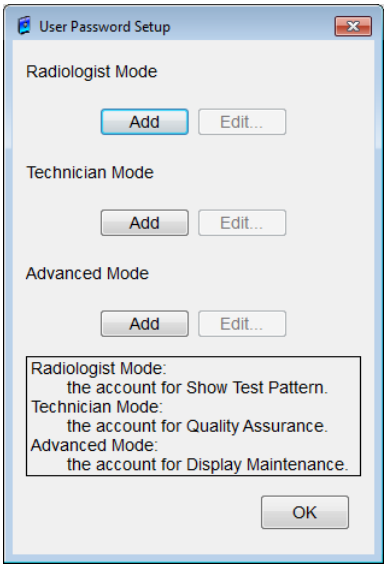

Figure 113: User Password Setup dialog box

Here you can define passwords for **Radiologist**, **Technician** or **Advanced** (expert) users to access certain levels and functions.

Add button — Shows the **Password Registration** dialog box (**Figure 114**) for each user level. This cannot be clicked if a password has already been set for that user level.

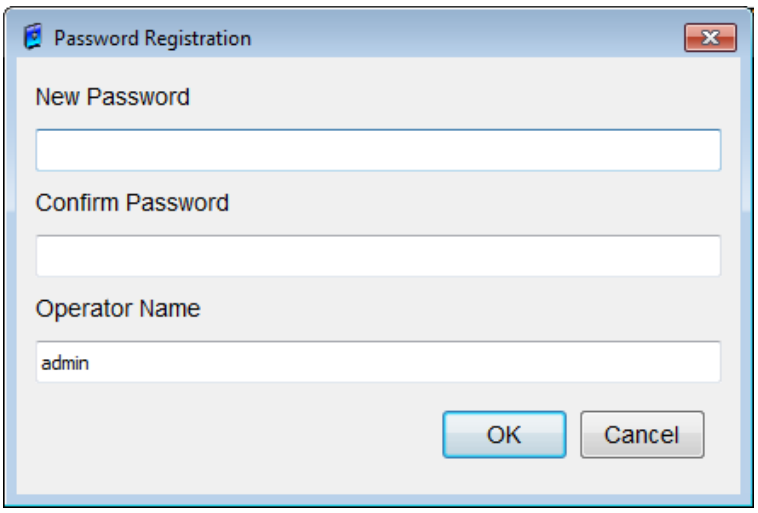

Figure 114: Password Registration dialog box

Edit button — Shows the **Password Modification** dialog box (**Figure 115**) for each user level. This cannot be clicked if no password has been set for that user level.

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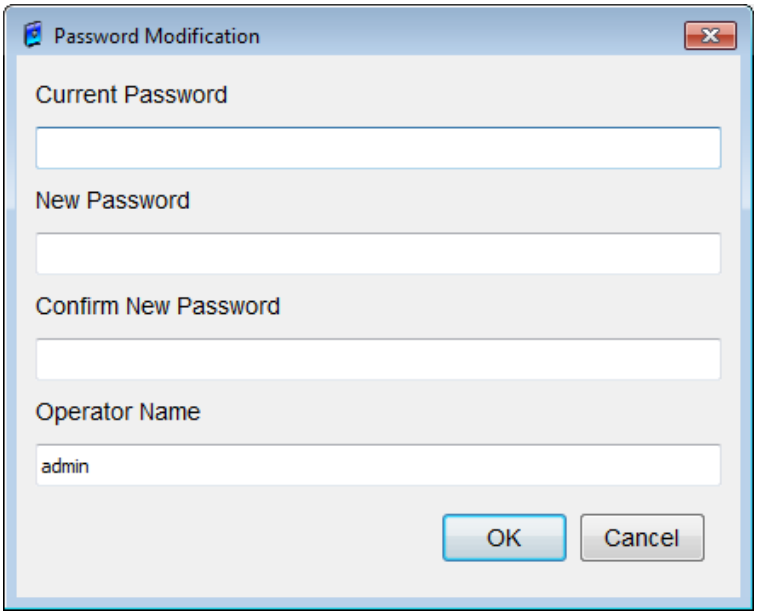

Figure 115: Password Modification dialog box

OK button Closes the dialog box.

NOTE: The **Advanced Mode** user must make sure not to lose any user passwords.
See **2.11 Lost Password** (page 16).

7.7.2.3. Startup User Level

When **Startup User Level** button is click in **Administrator**, the **Startup User Level** dialog box, as shown in **Figure 116**, is displayed. It is set the User Level that is executed when you double-click the **GammaCompMD QA Client** icon in the taskbar. It is not affected by this setting when you perform a function in other than double clicking GammaCompMD QA Client icon.

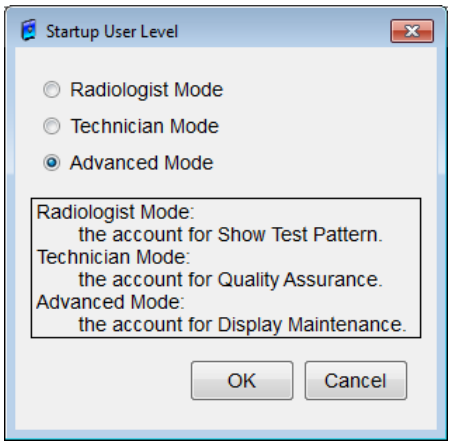

Figure 116: Startup User Level dialog

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7.7.3. Extra Features

7.7.3.1. White Luminance Measurement

When **White Luminance Measurement** is click in **Administrator**, the White Luminance Measurement Start dialog box, as shown in **Figure 117**, is displayed.

If both display sensors and external sensors have been set for various displays, measurement starts with the displays with display sensors, then continues with displays for which external sensors are set. Although measurement is executed simultaneously for multiple display sensors (except MD212G3/MD215MG/MD211G5 and MD302C6), it is executed in ascending order of display numbers for external sensors.

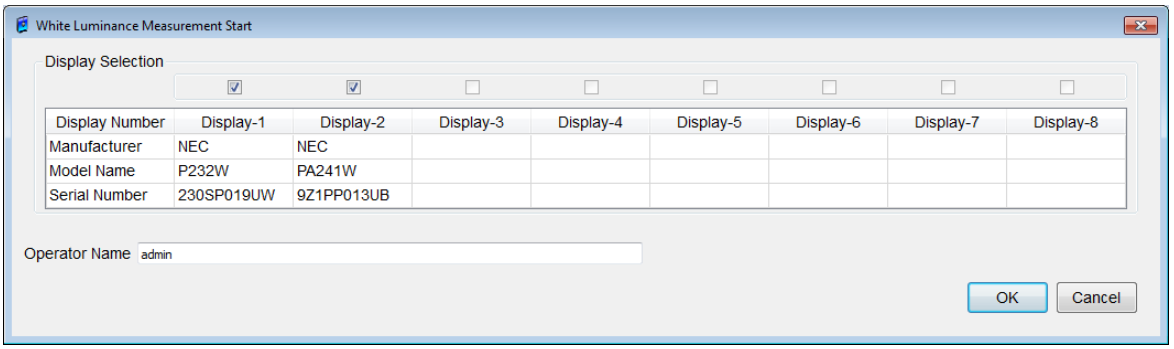

Figure 117: White Luminance Measurement Start dialog box

Display Selection	Displays can be selected by checking the checkboxes above the display numbers. Multiple displays can be selected.
Cancel button	Cancel the settings and close the dialog box.
OK button	When the **OK** button is clicked, measurement is started for the selected displays.

When an external sensor is used, the sensor contact position guide, as shown in **Figure 57** (page 81), is displayed. Click the **Continue** button to switch to the Measurement Start screen.

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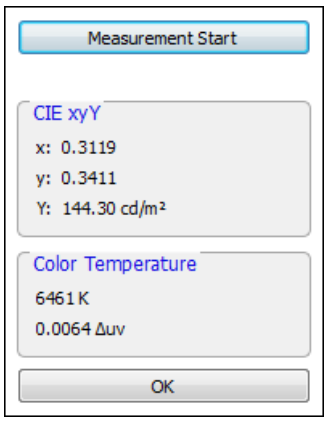

Figure 118: White Luminance Measurement Start screen

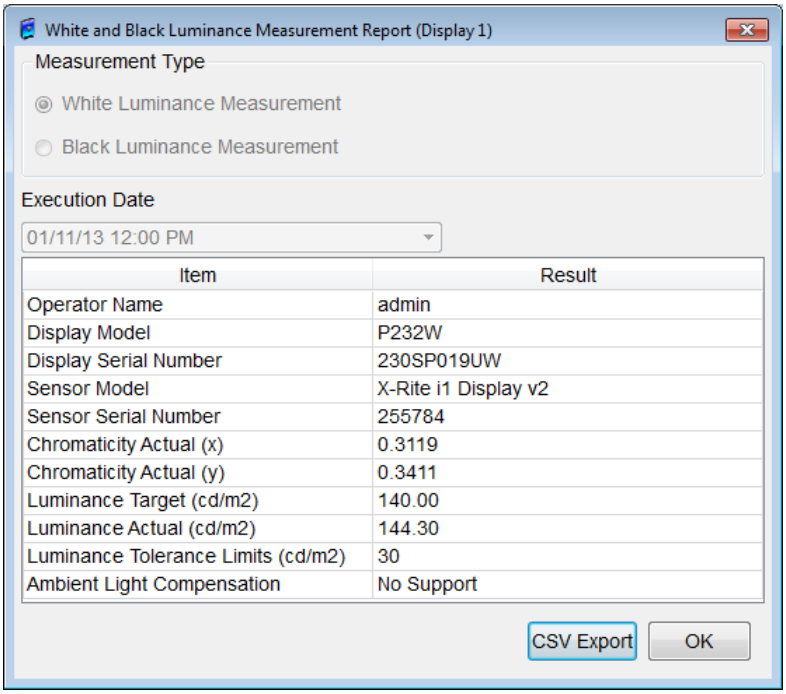

Figure 119: White Luminance Measurement Report dialog box

7.7.3.2. Black Luminance Measurement

Click the **Black Luminance Measurement** in **Administrator** to display the **Black Luminance Measurement** dialog box, as shown in **Figure 120**.

If both display sensors and external sensors have been set for various displays, measurement starts with the displays with display sensors, then continues with displays for which external sensors are set. Although measurement is executed simultaneously for multiple display sensors (except MD212G3/MD215MG/MD211G5 and MD302C6), it is executed in ascending order of display numbers for external sensors.

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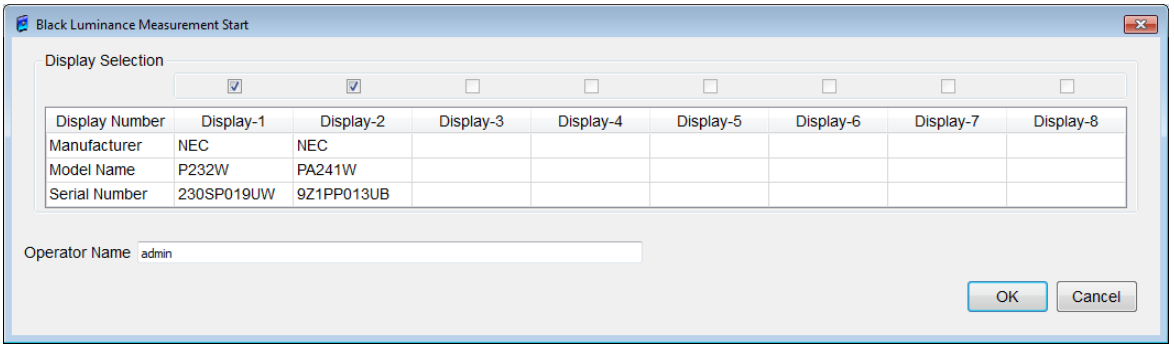

Figure 120: Black Luminance Measurement dialog box

Display Selection Check the box above the display number to select the display. Multiple displays may be selected.

Cancel button Closes the dialog box. The checks in the Display Selection and **Operator Name** are not applied.

OK button When the **OK** button is clicked, measurement is started for the selected displays.

When an external sensor is used, the sensor contact position guide shown in **Figure 57** (page 81) will be displayed. Click on the **Next** button to proceed to the **Measurement Start** Screen.

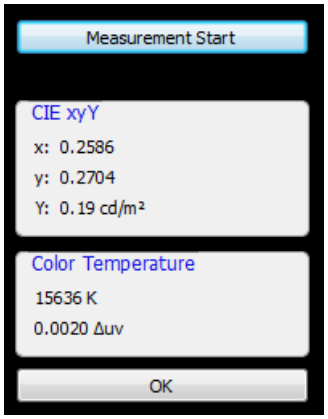

Figure 121: Black Luminance Measurement Start screen

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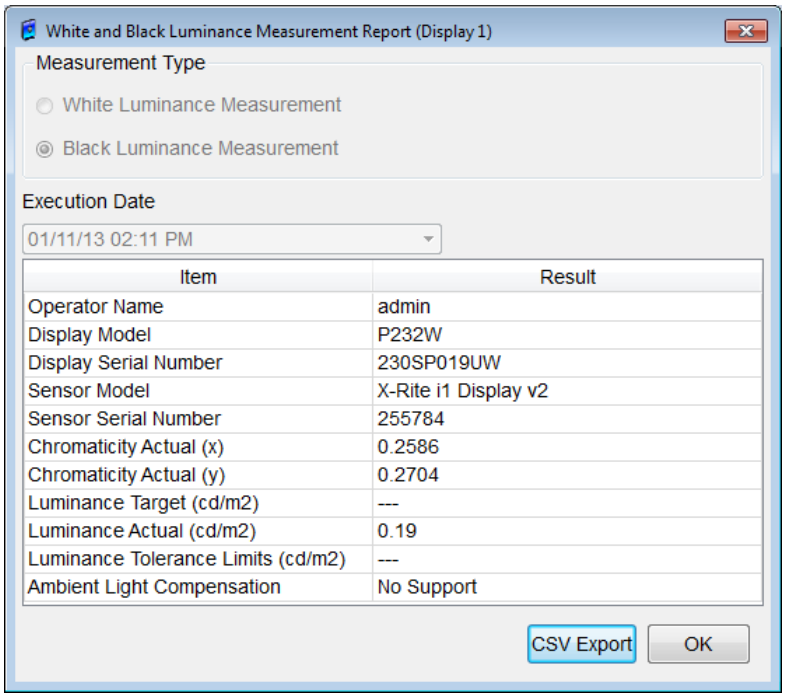

Figure 122: Black Luminance Measurement Report dialog box

7.7.3.3. Uniformity Test

Click the **Uniformity Test** in **Administrator** to display **Figure 123**, **Uniformity Test Start** dialog box.

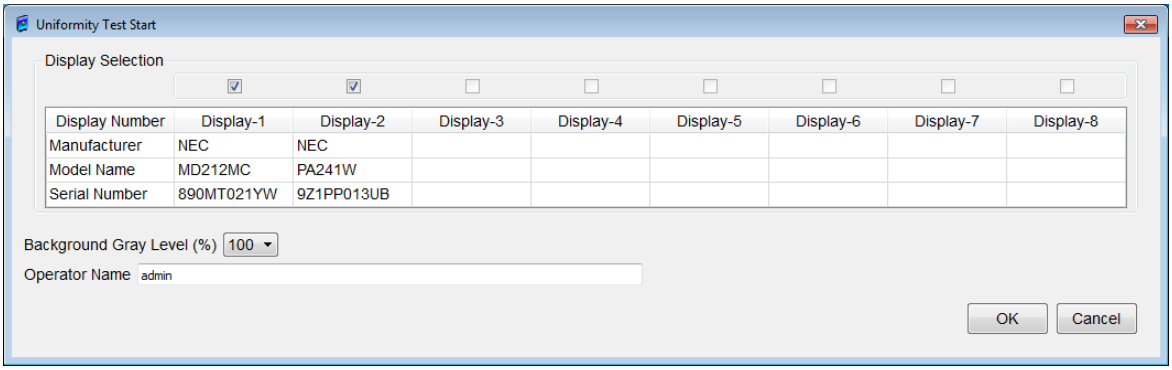

Figure 123: Uniformity Test Start dialog box

Display Selection Check the box above the display number to select the display. Multiple displays are selectable.

Background Gray Level (%)

For uniformity testing, the gray level of the measurement patches (M1, E1 to E4) can be selected for luminance levels 10, 50, 80, and 100%.

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Cancel button	Closes the dialog box without any action.
OK button	When the **OK** button is clicked, a uniformity test is started for the selected displays. Uniformity measurement patches similar to **Figure 124** are shown on each target display. The conformance test can be cancelled during execution using the **Cancel** button.

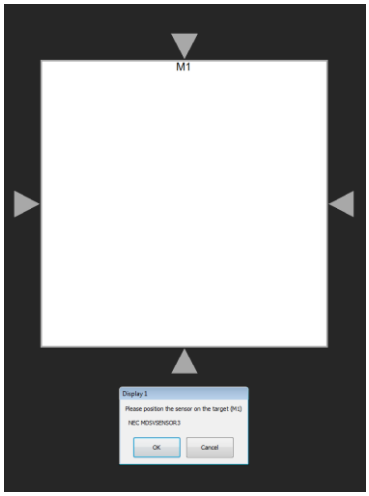

Figure 124: Uniformity Test dialog box

When the test is completed, the Uniformity Test Report dialog box similar to **Figure 125** is shown on each target display.

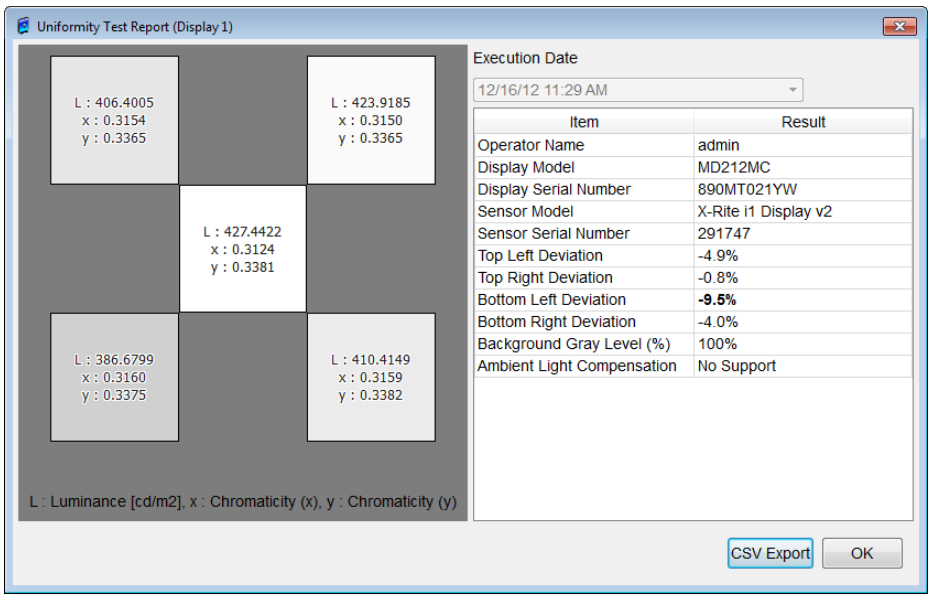

Figure 125: Uniformity Test Report dialog box

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NOTE:

・The luminance for the uniformity test reports refers to the output luminance for the target curve designated in the **Grayscale Function** tab within **7.2.5 Calibration Setup** (page 64).

・An external sensor is required for uniformity testing. (Even if a display sensor was selected, the external sensor is automatically used.) If an external sensor is not connected or other application is using external sensor, the **Figure 126** is displayed.

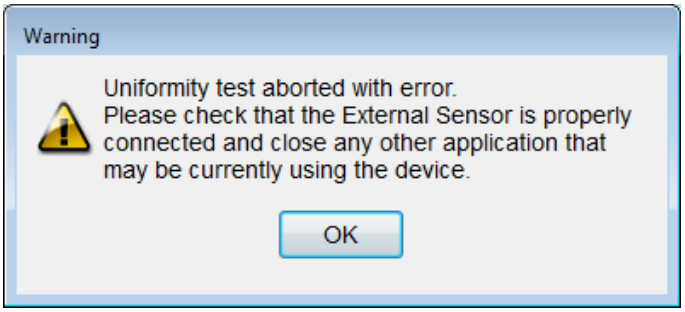
Warning
Uniformity test aborted with error.
Please check that the External Sensor is properly connected and close any other application that may be currently using the device.
OK

Figure 126：Warning dialog box

7.7.3.4. Display Matching

When you click on **Display Matching** in **Administrator**, the Display Matching dialog box **Figure 127** is displayed. Display matching is a function to adjust the luminance, color temperature and gamma correction curve from one display to one or more displays. The goal is that a target display has the same luminance, color temperature and gamma correction curve as the source display. An external sensor is required to perform display matching. Please refer to **7.2.6 Sensor Setup** (page 77) regarding correct sensor settings.

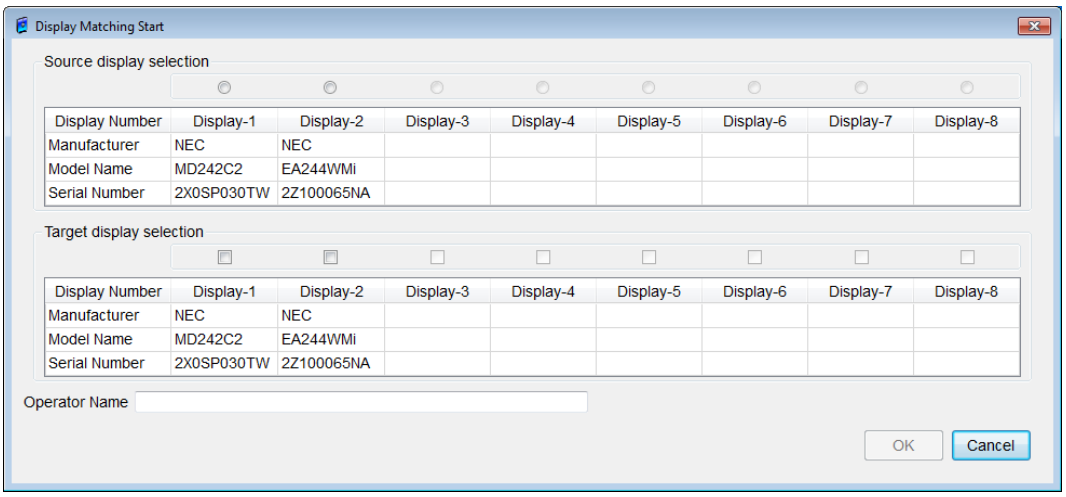

Figure 127: Display Matching dialog box

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Source display selection	The source display can be selected with the radio button above the display number. Only one unit can be selected as the source display.
Target display selection	The target display can be selected with the check box above the display number. Multiple target displays can be selected. You cannot select a target display if a source display has not been selected.
Cancel button	Closes the dialog box and cancels **Display Matching**.
OK button	Start Display Matching with the **OK** button. If the **Calibration Setup** dialog is displayed, it will automatically close when display matching starts. You can only click on **OK** if the source display and at least one target display are selected and the **Operator Name** is entered.

NOTE:

・If you are using a sensor without color support or the target display is a grayscale display, the color temperature cannot be adjusted.

・If the interface mode for both the source display and the target display is set as **NAVDisplay,** the displays are not selectable. If the interface mode is set to **StdDisplay** for the target display, this display is also not selectable.

・After all measurements on the source display have completed, all calibration parameters of the source display will be used to calibrate the target display(s). The calibration will not return to the previous parameters, if the calibration of the target display is cancelled or interrupted.

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7.7.3.5. Create Modification Log Entry

When **Create Modification Log Entry** is clicked in **Administrator**, the **Create Modification Log Entry** dialog box, as shown in **Figure 128**, is displayed. Enter any text (such as “change display” or “execute calibration”) in the input field. The entered log name is shown as an **Event** in the Log Viewer (Level**:** Modification Log, Original**:** Operator).

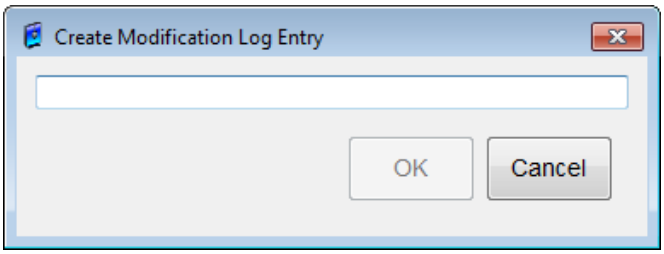

Figure 128: Create Modification Log Entry dialog box

Input field	Up to 127 Upper case or lower case alphanumeric characters or special characters (%, #, *, @, etc.) are valid.
OK button	Saves the settings and closes the dialog box. The **OK** button cannot be clicked unless any character is entered in the input field.
Cancel button	Closes the dialog box without saving any settings.

7.7.3.6. Display Control Button Lock

When you click on **Display Control Button Lock** in **Administrator**, the **Display Control Button Lock** dialog box is displayed, as shown in **Figure 129**. This function is used to lock the buttons which are used to control the On-Screen-Display (**OSD**) function of a display. Locking the buttons of a calibrated display is very essential to prevent any changes of the display characteristics from intended or unintended tampering.

Displays other than those made by NEC, and displays where the **Interface Mode** is set as **StdDisplay** or **NAVDisplay**, cannot be selected. Also the NEC models MD212G3, MD205MG, MD205MG-1, MD215MG, MD211G5 and MD302C6, as well as NEC Large Format Displays are not selectable, because they do not support the **Display Control Button Lock** function. Please refer to the list **1.7 Supported Display Models** (page 11).

NOTE: If one of the **Lock** commands is set, it will be only applied **after the calibration is complete**. The **Lock** settings will not be applied if the calibration fails. If **Do not lock control buttons** is set, any **Lock** is released when the calibration starts.

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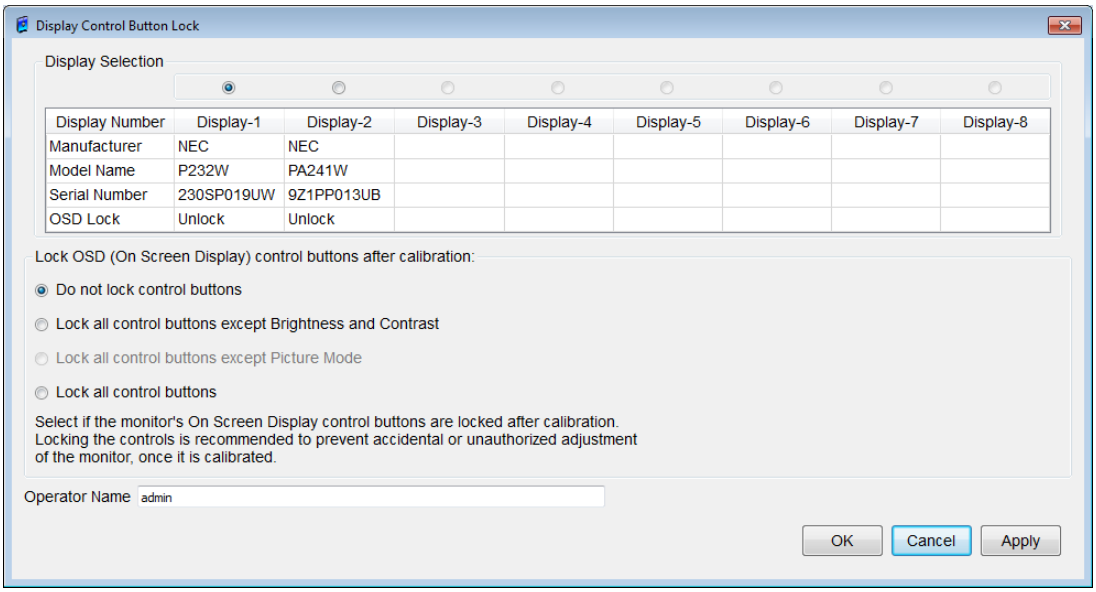

Figure 129: Display Control Button Lock dialog box

Display Selection The display can be selected by changing the radio button above the display number to ON. Only one display can be selected at one time.

Lock OSD (On Screen Display) control buttons after calibration

Select one of the following three types for the lock status. The current settings will be selected when the display is selected.

- **Do not lock control buttons**
  Enable all OSD control buttons
- **Lock all control buttons except Brightness and Contrast (Partial lock)**
  Lock OSD control buttons except for Brightness and Contrast ratio. Only brightness changes will be possible on displays which do not support contrast ratio changes.
- **Lock all control buttons except Picture Mode**
  Lock OSD control buttons except for Picture Mode.
- **Lock all control buttons**
  Lock all OSD control buttons. If all buttons are locked, **OSD LOCK OUT** will be displayed when an OSD control buttons is pressed on the blocked display.

OK button Saves the settings and closes the screen. The **OK** button cannot be clicked if the **Operator Name** is not entered.

Cancel button Closes the dialog screen without any action.

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Apply button	The settings are applied, but the dialog is not closed. The **Apply** button cannot be clicked if the **Operator name** is not entered.

NOTE: For NEC EA series displays, the following 2 lock types will show the same result:

- "Lock all control buttons except Brightness and Contrast"
- "Lock all control buttons".

7.7.4. Special Reports

7.7.4.1. White and Black Luminance Measurement Reports

Click on **White and Black Luminance Measurement Reports** in the **Administrator** menu to display the **White and Black Luminance Measurement Reports** dialog box.

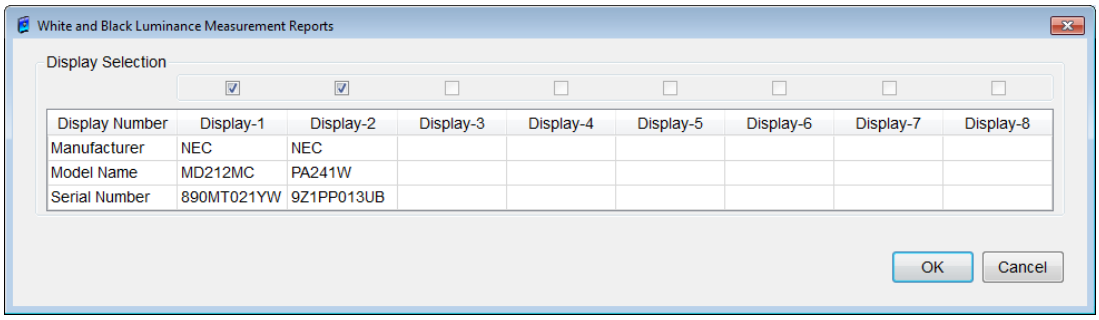

Figure 130: White and Black Luminance Measurement Reports dialog box

Display Selection	Check the box above a display to select this display. Multiple displays may be selected.
Cancel button	Closes the dialog box.
OK button	Show the **White and Black Luminance Measurement Report** dialog box for the selected display. The **OK** button cannot be clicked if no display is selected.

The **White and Black Luminance Measurement Report** contains the following items**:** Operator Name, Display Model, Display Serial Number, Sensor Model, Sensor Serial Number, Chromaticity Actual (x, y), Luminance Target (cd/m^2), Luminance Actual (cd/m^2) and Luminance Tolerance Limits (cd/m^2).

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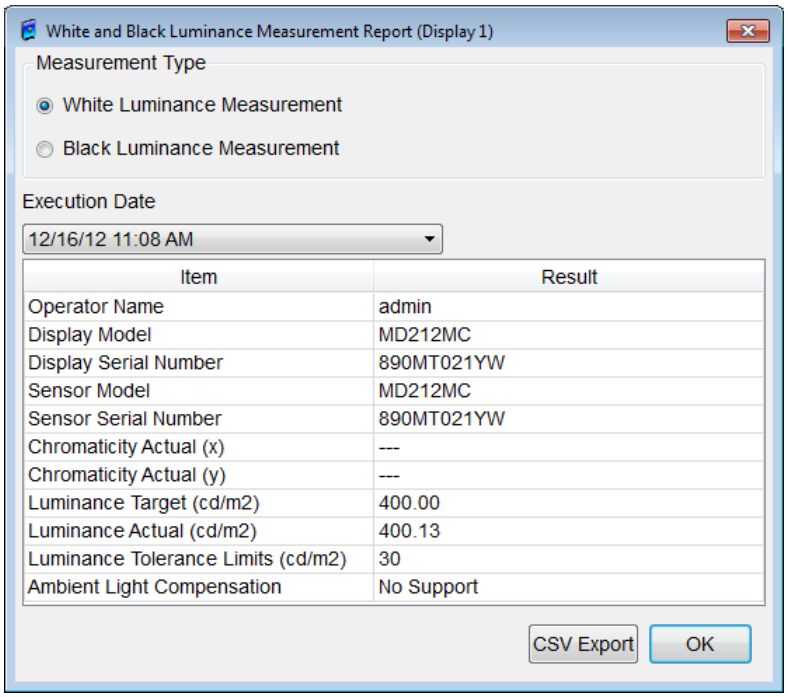

Figure 131: White and Black Luminance Measurement Report dialog box

Measurement Type — Select **White Level Measurement** or **Black Level Measurement** to display a list measurement reports for the item selected.

Execution Date — If the listbox under **Execution Date** is clicked, the latest report will be displayed at the top, with previous reports underneath in order of date and time. Click the date you wish to view and this date's measurement report will be displayed.

CSV Export button — Reports can be saved as a CSV file.

OK button — Closes the dialog box.

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7.7.4.2. Uniformity Test Reports

Click **Uniformity Test Reports** in **Administrator** to display the **Uniformity Test Reports** dialog box.

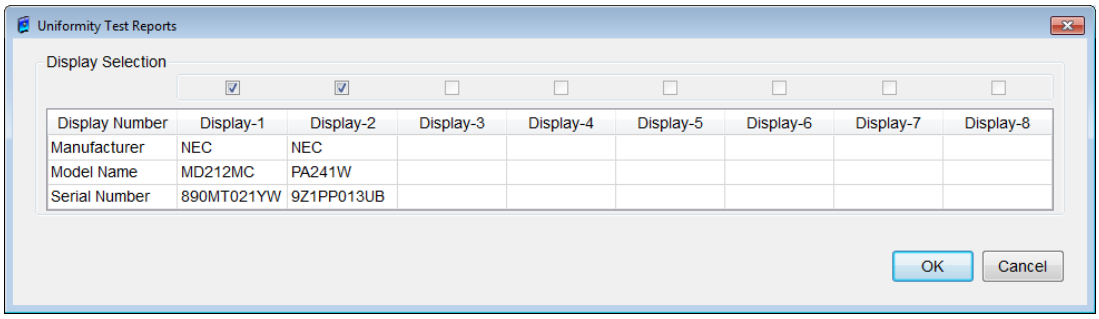

Figure 132: Uniformity Test Reports dialog box

Display Selection Check the box above a display to select the display. Multiple displays can be selected.

Cancel button Closes the dialog box.

OK button Shows the **Uniformity Test Report** dialog box for the selected display, see **Figure 133**. The **OK** button cannot be clicked if no display is selected.

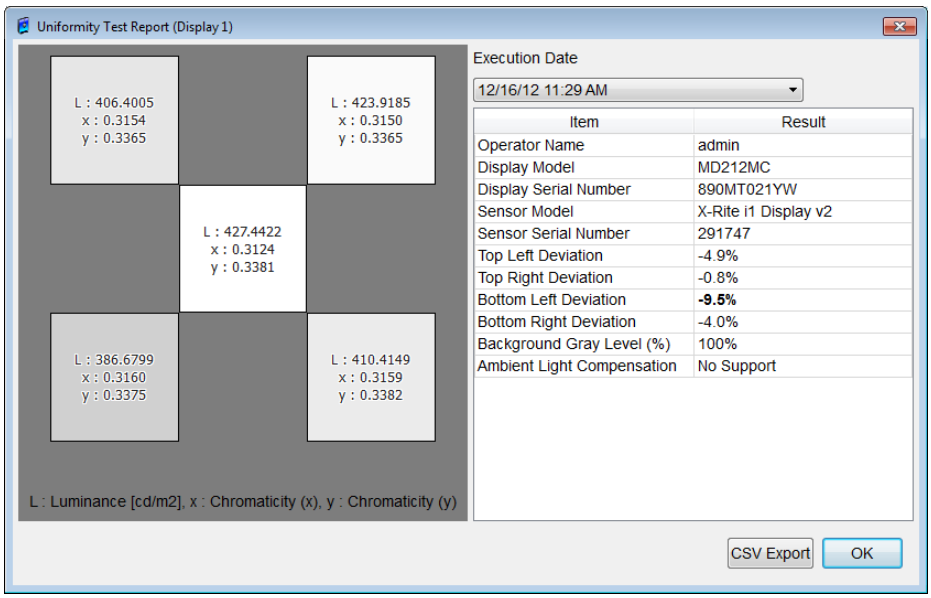

Figure 133: Uniformity Test Report dialog box

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Execution Date	If the listbox under **Execution Date** is clicked, the latest report will be displayed at the top, with previous reports underneath in order of date and time. Click the date you wish to view and that day's measurement report will be displayed.
Graph	The left hand side of the report shows the 5-point measurement graph. The graph shows the luminance and chromaticity (x, y) values for each screen area, and compares the luminance to the center area by lightening or darkening the area visually.

The list on the right hand side contains the following items**:** Operator Name, Display Model, Display Serial Number, Sensor Model, Sensor Serial Number, Top Left Deviation, Top Right Deviation, Bottom Left Deviation, Bottom Right Deviation and Background Gray Level (%).

CSV Export button	Reports can be saved as a CSV file.
OK button	Closes the dialog box.

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7.7.4.3. Latest Results List

Click **Latest Results List** in **Administrator** to show the **Latest Calibration Reports Display Selection** dialog box.

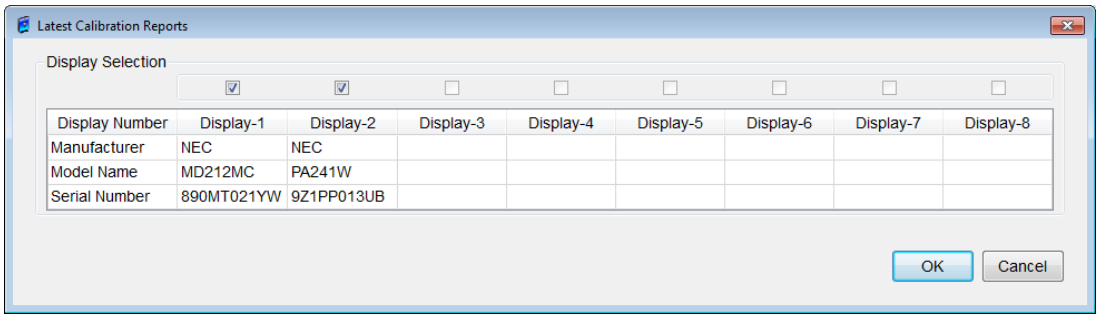

Figure 134: Latest Calibration Reports Display Selection dialog box

Display Selection — Check the box above a display to select it. Multiple displays are selectable.

Cancel button — Closes the dialog box.

OK button — Display **Latest Report List (Display x)** dialog box, for the selected Display, see **Figure 135**. If no tests have been done, **No Data** will be displayed. The **OK** button cannot be clicked if no display is selected.

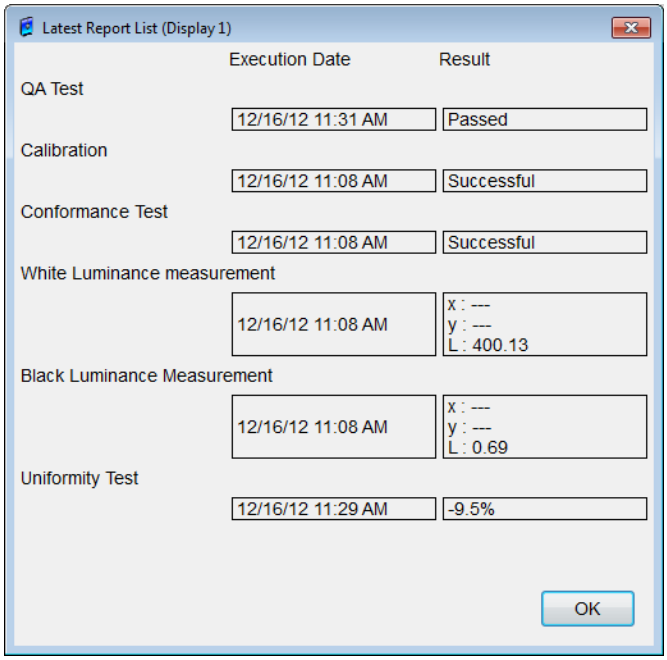

Figure 135: Latest Report List (Display x) dialog box

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7.7.4.4. Display Information

When **Display Information** is clicked in **Administrator**, the **Display** Information dialog box, as shown in **Figure 136**, is displayed. This dialog box shows information about connected and supported displays.

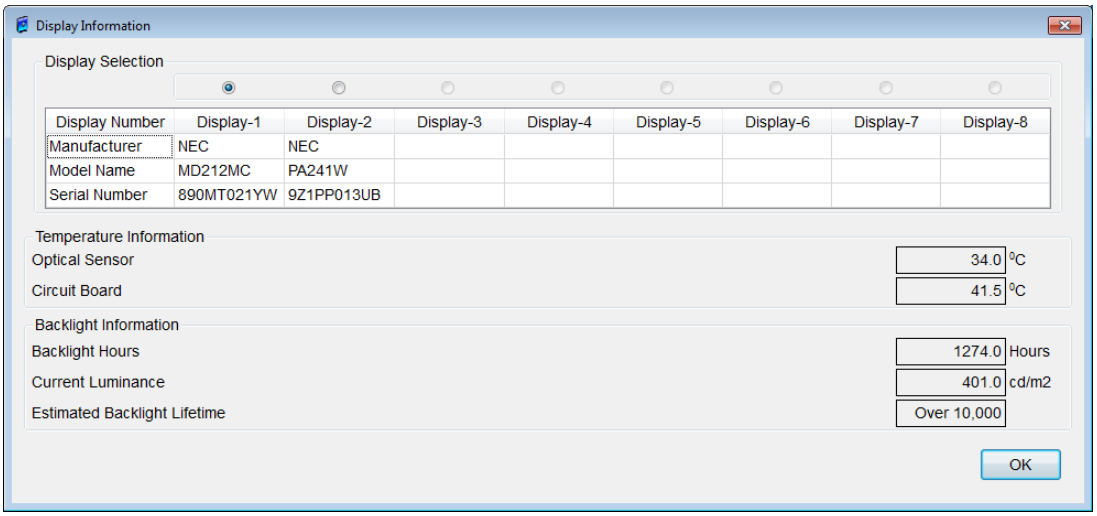

Figure 136: Display Information dialog box

Display Selection Select a display, one at a time, by clicking the radio buttons above the display numbers.

Temperature Information and Backlight Information

Temperature and backlight information are displayed for the display whose radio button is selected in the Display Selection area. However, **No data** is displayed for any item where no information was received from the display.

- **Optical Sensor**
  Display the Celsius temperature of the optical sensor.
- **Circuit Board**
  Display the Celsius temperature of the circuit board.
- **Backlight Hours**
  Display the number of hours that the backlight was active on.
- **Current Luminance**
  Display the current luminance value.
- **Estimated Backlight Lifetime**
  Display the estimated backlight lifetime.

OK button Closes the dialog box.

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7.7.4.5. System Information

When **System Information** is clicked in **Administrator**, the **System Information** dialog box, as shown in **Figure 137**, is displayed. This dialog box shows information about displays that are connected. This dialog box shows display controller information and calibration schedule information for each supported display.

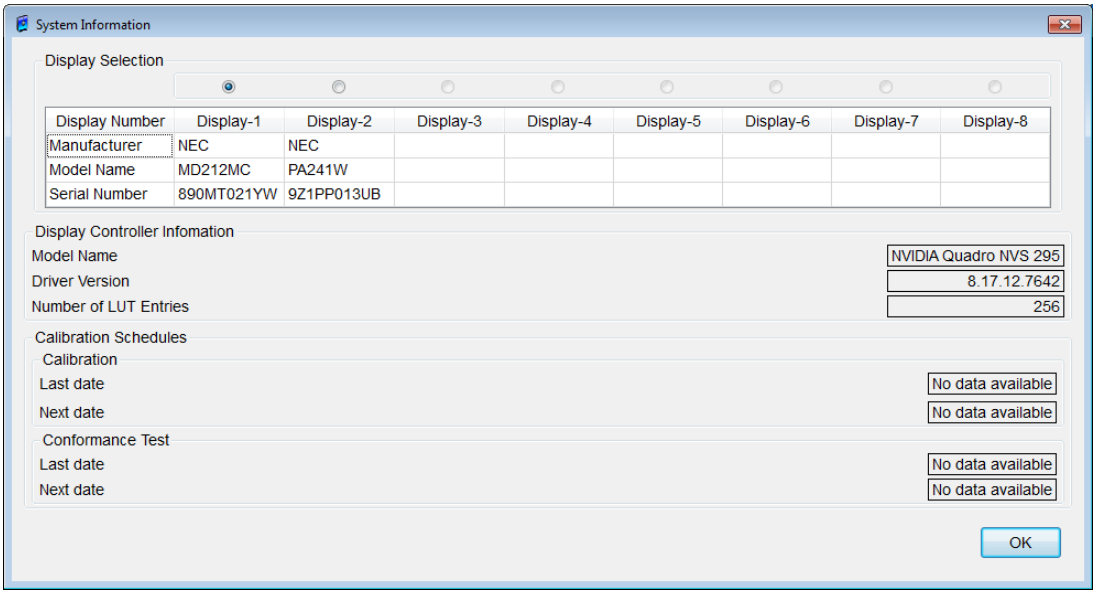

Figure 137: System Information dialog box

- **Display Selection**

Select a display, one at a time, by clicking the radio buttons above the display numbers.

Display Controller Information

Information is displayed for the controller used by the display whose radio button is selected in the Display Selection area. “No Data” is displayed for any item where no information was received from the system.

- **Model Name**

  Displays the model name of the display controller with which the selected display is connected.

- **Driver Version**

  Displays the driver version of the display controller with which the selected display is connected.

- **Number of LUT Entries**

  Displays the number of lookup table (LUT) entries for the display controller with

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which the selected display is connected.

Calibration Schedules Calibration and conformance test execution information is displayed for the display whose radio button is selected in the Display Selection area. “No Data” is displayed for any item where no information was received from the system.

- **Calibration (Last Date)**
  Shows the last date and time of when the selected display was calibrated. If there is no execution history, “No Data available” is displayed.
- **Calibration (Next Date)**
  Displays the next date and time when the selected display is scheduled to be calibrated. If the next calibration is not scheduled, “No Data available” is displayed.
- **Conformance Test (Last Date)**
  Displays the last date and time when a conformance test was executed for the selected display. If there is no execution history, “No Data available” is shown.
- **Conformance Test (Next Date)**
  Displays the next date and time a conformance test is scheduled for the selected display. If the next conformance test is not scheduled, “No Data” is displayed.

OK button Closes the dialog box.

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8. Help

This is a guide to the functions in the **Display Maintenance** displayed when **Help** is clicked on the menu bar.

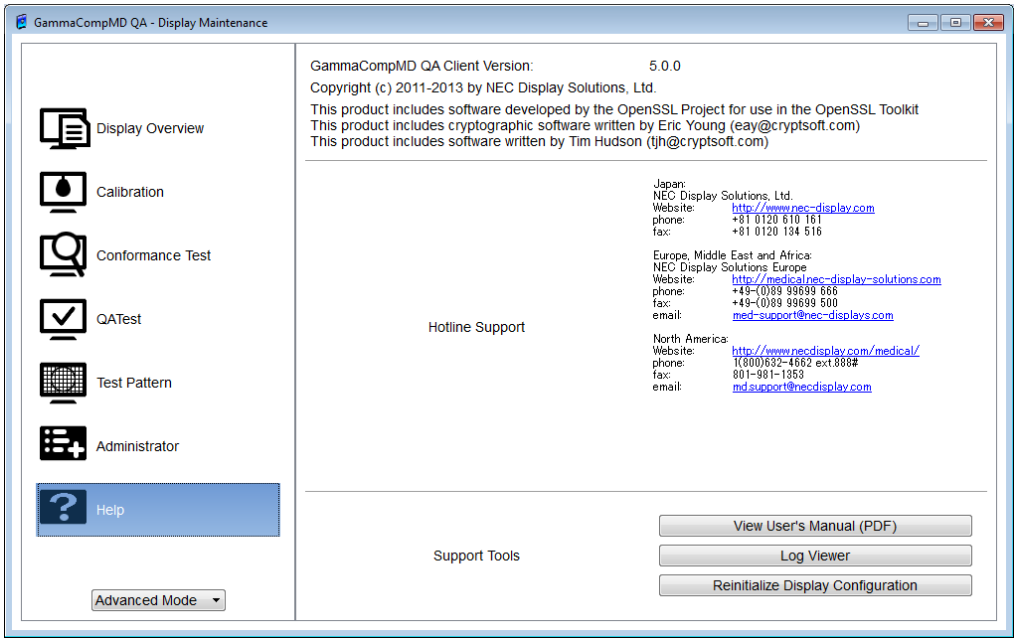

Figure 138: Help screen

Version Information GammaCompMD QA Client Version and copyright notice.

Hotline Support **A** list of support center contacts.

Support Tools

- **View User's Manual (PDF)**

Display the User's Manual (PDF). Adobe Reader is required to read PDF File. (Recommended Ver7.0 or later)

- **Log Viewer**

Shows the Log Viewer content, as shown in **10 Log Viewer** (page 153)

- **Reinitialize Display Configuration**

To re-initialize the display configuration, as shown in **7.7.1.1 Re-initialization of Display Configuration** (page 105).

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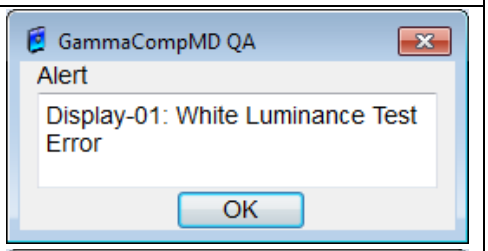
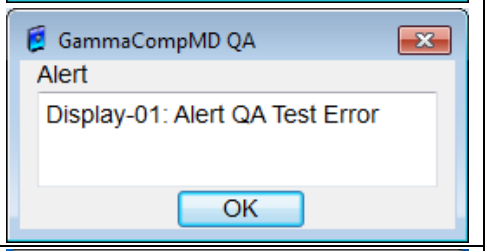
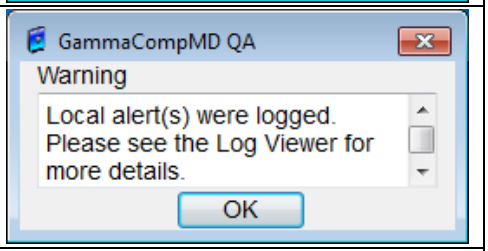
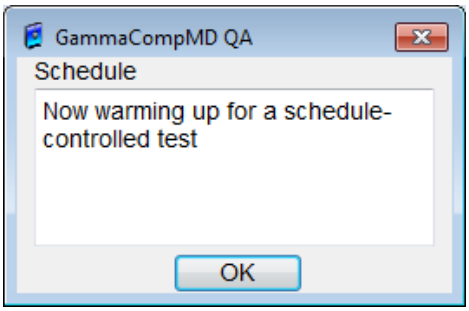
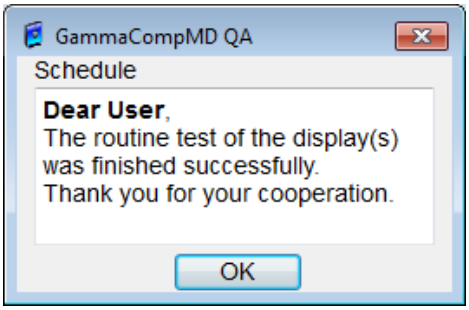
9. Alert and Warning Popup Windows

GammaCompMD QA Client displays popup windows with alerts, warnings and information on scheduled actions. The popup windows appear in the bottom right hand corner of the display, which is configured as the **[main display]** in Windows. Here are the main types of messages.

Type	Summary	**Example Message**
Alert	Alerts set in: **7.7.1.5 Alert Setup** (page 116)	 
Warning	Information about internal errors in GammaCompMD QA Client	
Information about Scheduled Actions	Messages shown before schedule execution, execution reports	 

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10. Log Viewer

The **Log Viewer** (Figure 139) is a log in which operation logs, operation records, local alerts, warnings, application logs, network access logs, etc. can be viewed in chronological order.

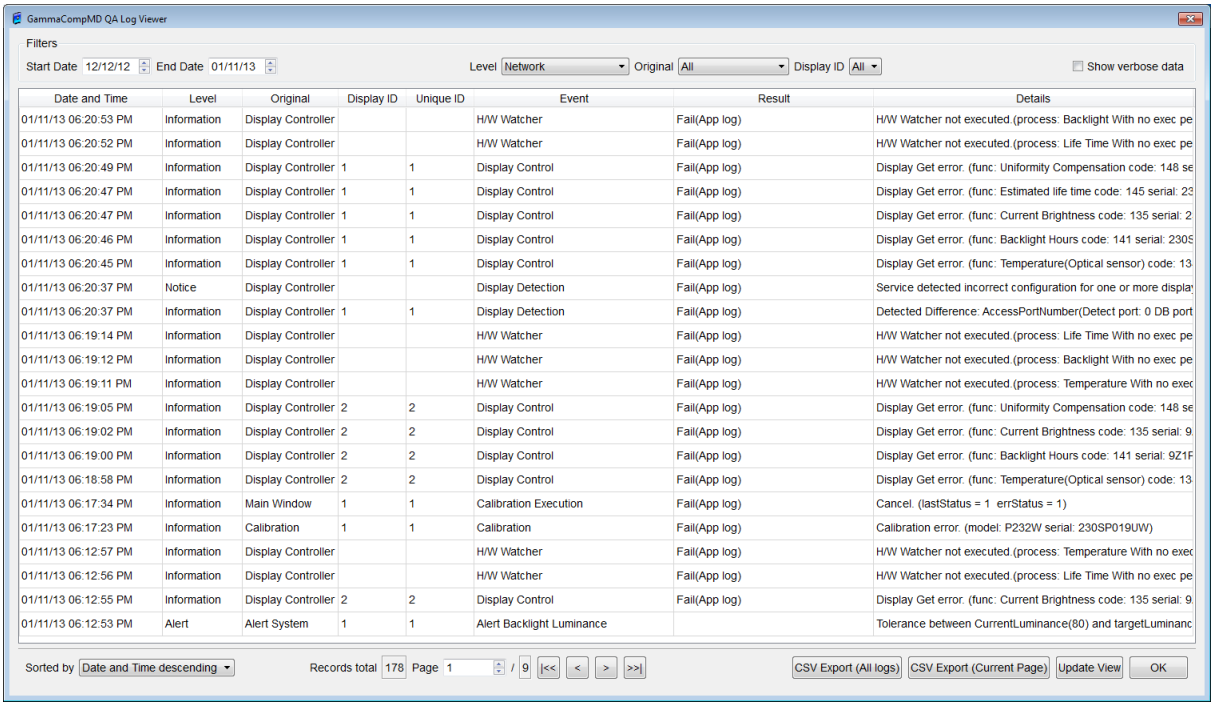
GammaCompMD QA Log Viewer
Filters
Start Date 12/12/12 End Date 01/11/13
Level Network Original All Display ID All
Show verbose data
Date and Time | Level | Original | Display ID | Unique ID | Event | Result | Details
01/11/13 06:20:53 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Backlight With no exec pe
01/11/13 06:20:52 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Life Time With no exec pe
01/11/13 06:20:49 PM | Information | Display Controller | 1 | 1 | Display Control | Fail(App log) | Display Get error. (func: Uniformity Compensation code: 148 se
01/11/13 06:20:47 PM | Information | Display Controller | 1 | 1 | Display Control | Fail(App log) | Display Get error. (func: Estimated life time code: 145 serial: 23
01/11/13 06:20:47 PM | Information | Display Controller | 1 | 1 | Display Control | Fail(App log) | Display Get error. (func: Current Brightness code: 135 serial: 2
01/11/13 06:20:46 PM | Information | Display Controller | 1 | 1 | Display Control | Fail(App log) | Display Get error. (func: Backlight Hours code: 141 serial: 230S
01/11/13 06:20:45 PM | Information | Display Controller | 1 | 1 | Display Control | Fail(App log) | Display Get error. (func: Temperature(Optical sensor) code: 13
01/11/13 06:20:37 PM | Notice | Display Controller | | | Display Detection | Fail(App log) | Service detected incorrect configuration for one or more displa
01/11/13 06:20:37 PM | Information | Display Controller | 1 | 1 | Display Detection | Fail(App log) | Detected Difference: AccessPortNumber(Detect port: 0 DB port
01/11/13 06:19:14 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Life Time With no exec pe
01/11/13 06:19:12 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Backlight With no exec pe
01/11/13 06:19:11 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Temperature With no exec
01/11/13 06:19:05 PM | Information | Display Controller | 2 | 2 | Display Control | Fail(App log) | Display Get error. (func: Uniformity Compensation code: 148 se
01/11/13 06:19:02 PM | Information | Display Controller | 2 | 2 | Display Control | Fail(App log) | Display Get error. (func: Current Brightness code: 135 serial: 9
01/11/13 06:19:00 PM | Information | Display Controller | 2 | 2 | Display Control | Fail(App log) | Display Get error. (func: Backlight Hours code: 141 serial: 9Z1F
01/11/13 06:18:58 PM | Information | Display Controller | 2 | 2 | Display Control | Fail(App log) | Display Get error. (func: Temperature(Optical sensor) code: 13
01/11/13 06:17:34 PM | Information | Main Window | 1 | 1 | Calibration Execution | Fail(App log) | Cancel. (lastStatus = 1 errStatus = 1)
01/11/13 06:17:23 PM | Information | Calibration | 1 | 1 | Calibration | Fail(App log) | Calibration error. (model: P232W serial: 230SP019UW)
01/11/13 06:12:57 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Temperature With no exec
01/11/13 06:12:56 PM | Information | Display Controller | | | H/W Watcher | Fail(App log) | H/W Watcher not executed.(process: Life Time With no exec pe
01/11/13 06:12:55 PM | Information | Display Controller | 2 | 2 | Display Control | Fail(App log) | Display Get error. (func: Current Brightness code: 135 serial: 9
01/11/13 06:12:53 PM | Alert | Alert System | 1 | 1 | Alert Backlight Luminance | | Tolerance between CurrentLuminance(80) and targetLuminanc
Sorted by Date and Time descending
Records total 178 Page 1 / 9 |<< < > >>|
CSV Export (All logs) CSV Export (Current Page) Update View OK

Figure 139: Log Viewer

Filters — The displayed information can be filtered by Start Date, End Date, Level, Origin and Display ID. Click Update View after choosing your **Filters** settings.

- **Start Date** and **End Date**

Change the start and end date displayed using the ▲▼ buttons.

- **Start Date**

When the log viewer is opened, all items with end dates in the last 30 days will be displayed. If the date is changed, the end date order may be automatically changed to accommodate the changes.

- **End Date**

When the log viewer is opened, the system date will be displayed. When changing this date, using the ▲▼ buttons, you cannot set a date later than the current system date. If the date is changed, the start date order may be automatically changed to accommodate the changes.

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- **Level**

You may choose the type of log level.

Level	Explanation
Network	Server access log
Information (Level 2)	Application task log
Modification log	Operation record
Notice (Level 3)	Log of notices from applications
Alert	Alert record
Error (Level 4)	Application errors

- **Origin**

You can choose the origin (source) of the logs which are displayed.

Origin	Explanation
All	All origins
Core Service	Shows GammaCompMD QA system service.
Display Controller	Shows display configuration modules.
Service Assistant	Shows popup window modules.
Initialization	Shows initialization modules.
Main Window	Shows the main window.
Calibration	Shows calibration execution modules.
QA	Shows QA Test execution modules.
Scheduler	Shows schedule execution modules.
Server	Shows the server.

- **Display ID**

You can choose to view log related to a specific display.

- **Show verbose data**

Check this box and click the **Update View** button to view logs which are not usually shown ("…Error" for events, Fail(AppLog) for reports, etc.)

Sorted by Change between descending and ascending orders.

Page buttons (|<<、<、>、>>|)
|<<: Go to first page <: Go to previous page
>: Go to next page >>|: Go to last page

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Page	Number box to select a certain page. Choose the page number by clicking ▲▼, or type a number. Then click the **Update View** button to go to the page you wish to view.
CSV Export (All logs)	Click **CSV Export (All logs)** to show the **Log Viewer Save File** dialog box. Enter a file name for this .csv file and click the **Save** button to save the complete log to a file.
CSV Export (Current Page)	Click **CSV Export (Current Page)** to show the **Log Viewer Save File** dialog box. Enter a file name for this .csv file and click the **Save** button to save the current page to a file.
Update View button	Updates log displayed according to your filter settings or other choices.
OK button	Closes the Log Viewer.

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11. Trend Viewer

The trend viewer shows historical results of calibrations, conformance tests and QA tests in a graphical representation.

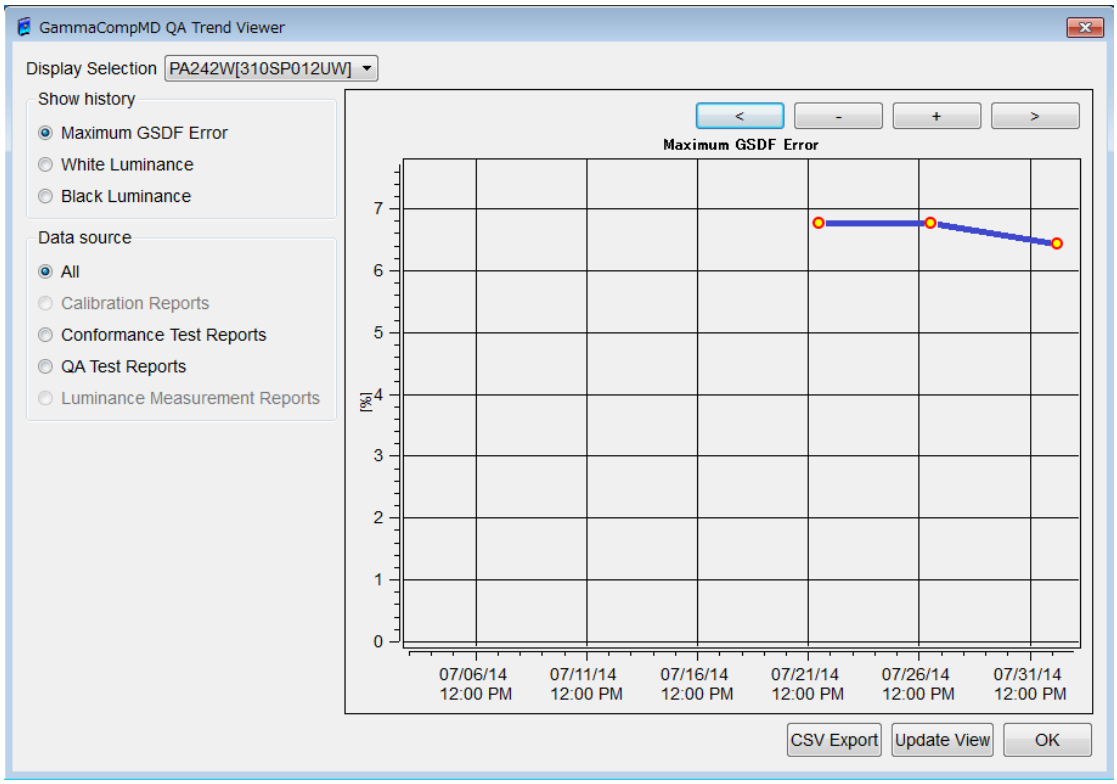

Figure 140: Trend Viewer

- **Display Selection**

Select a display for which the graph should be created. Model name and serial number of all connected displays - except Navigation/Admin/RIS monitor**s** - are listed in a listbox to choose from.

- **Show history**

Select the type of historical data to create the graph. Select one of the following:

- Maximum GSDF Error
- White Luminance
- Black Luminance

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- **Data Source**

Select the data source of historical data to create the graph. A report without any data cannot be selected. You can select data sources as follows:

	Maximum GSDF Error	White Luminance	Black Luminance
All	Selectable	Selectable	Selectable
Calibration Reports	Not selectable	Selectable	Selectable
Conformance Test Reports	Selectable	Selectable	Selectable
QA Test Reports	Selectable	Selectable	Selectable
Luminance Measurement Reports	Not selectable	Selectable	Selectable

When "All" is selected, the measured values of all reports will be unified.

- **Graph area**

A graph is drawn according to selection.
'No data available' is shown if no report data is available.
The default timeline shows the last 30 days to the present date.
You may change the timeline of the graph by dragging the mouse and zoom in/and zoom out, using the mouse wheel.

Buttons for graph operation. (< + - >)

The timeline of the graph may be updated by button operation as well:

< button	The timeline moves to the left.
> button	The timeline moves to the right.
- button	The timeline is zoomed out
+ button	The timeline is zoomed in

CSV Export Button The graph data can be saved as a CSV file. Graph data outside the visible timeline will be saved as well.

Update View The graph is updated with the latest available data.

OK Button Clicking OK closes the trend viewer.

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12. Troubleshooting

No	Occurrence/Error	Solution
1	An error dialog appears stating “Communication with system service failed. Please check System Configuration Initialization in Settings and try again.”	The database service or system service was not accessible. 1.) Go to **7.7.1.2 Reinitialize System Configuration** (page 108) and restart the database service or system service. 2.) Check if the port number is not being used for a different application.
2	An error dialog appears stating “Communication with display failed. Please check settings and try again.”	Display information could not be obtained from the QAengine service. Go to **7.7.1.2 Reinitialize System Configuration** (page 108) and restart the database service or system service.
3	An error dialog appears stating “Communication with database failed. Please check System Configuration Initialization in Settings and try again.”	The database service was not accessible. 1.) Go to **7.7.1.2 Reinitialize System Configuration** (page 108) and restart the database service or system service. 2.) Check with your IT Administrator to ensure that all firewall exceptions are in place as noted in **About GammaCompMD QA Client** (page 7).
4	An error dialog appears stating “Communication with sensor failed. Please check the connection and try again.”	Data from an external sensor could not be obtained during measurement. Check that the sensor is connected and set it again in **Sensor Setup**. (Refer to **7.2.6 Sensor Setup** , page 77).
5	An error dialog appears stating “Incorrect Image File”	The selected test pattern image file may be corrupted. Check that the image file is not corrupted and that the image format and size are correct. Then try again.
6	An error dialog appears stating “System service restart failed.”	A restart command was given to the engine service, enabling the database service, but the service could not start. Restart the system and try again.

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No	Occurrence/Error	Solution
7	An error dialog appears stating “System service start failed.”	A start command was sent to the engine service, enabling the database service, but the service could not start. Restart the system and try again.
8	An error dialog appears stating “An unforeseen error was detected in communication with the system service”	An unforeseen internal error occurred. Restart the system and try again.
9	An error dialog appears stating “The test using the specified number failed. Try a different number.”	Check whether the MD-N2M5B sensor is connected. If the sensor is connected, try again with a different serial number. Refer to **7.2.6 Sensor Setup** (page 77).
10	An error dialog appears stating “Reference calibration failed.”	Case 1: When using a display with integrated front sensor: Check whether an external sensor is connected. Case 2: When using a display without a front sensor: Check that the retractable sensor (MD-N2M5B) and an external sensor are connected. Refer to **7.2.6 Sensor Setup** (page 77). If the sensors are connected, check that the sensors are supported and try again. Refer to **1.5 External Sensors** (page 10).
11	An error dialog appears stating “Reference Calibration can't be performed with the selected external sensor. Please use a color sensor."	An external sensor that supports color measurements is required to run the reference calibration for the color display's front sensor. Confirm that the external sensor's settings are correct and retry. Refer to **7.2.6 Sensor Setup** (page 77).
12	An error dialog appears stating “No enabled external sensor found. Check the connection and try again.”	Check whether the sensor is connected. If the sensor is connected, check that this sensor is supported by **GammaCompMD QA Client**. Refer to **1.5 External Sensors** (page 10).

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No	Occurrence/Error	Solution
13	An error dialog appears stating “Calibration parameters could not be saved.”	The import files were not found for the custom gamma curve. In **Calibration Setup**, go to the **Grayscale Function** tab → **Custom Curve** -> **Edit** -> **Custom Gamma Curve** -> **Import…** and check that the file to be imported exists and try again. Refer to **7.2.5 Calibration** Setup (page 64).
14	An error dialog appears stating “Set first point to zero.”	The curve data being imported in the custom gamma curve dialog is not suitable. Make sure that the data starts from zero and the figures do not decrease.
15	An error dialog appears stating “Irregular increase in curve file figures”.	The curve data being imported in the custom gamma curve dialog is not suitable. Make sure that the data starts from zero and the figures do not decrease.
16	An error dialog appears stating “White level measurement was stopped due to an error.”	■ Check whether sensor and display are connected. ■ Close any other application which may use the sensor.
17	An error dialog appears stating “Black level measurement was stopped due to an error.”	■ Check whether sensor and display are connected. ■ Close any other application which may use the sensor.

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No	Occurrence/Error	Solution
18	An error dialog appears stating “Calibration was stopped due to an error.”	■ Check whether sensor and display are connected. ■ Calibration may not be possible with the selected calibration target values. Open the **Calibration Setup** dialog box, check the selected calibration target values (refer to **7.2.5 Calibration** Setup, page 64) and start calibration again. ■ Check that the correct preferred sensor is selected in **Sensor Setup**. Open the **Sensor Setup** dialog box, check the **Preferred Sensor** (refer to **7.2.6 Sensor Setup,** page 77) and start calibration again. ■ Close any other application which may use the sensor.
19	An error dialog appears stating “Calibration can't be performed with the current external sensor. Please change the White Luminance Calibration Mode or use a color sensor."	■ An external sensor that supports color is required, if the white luminance calibration mode is different from **Native** or **No Change**. ■ Change the white luminance calibration (**7.2.5 Calibration** Setup, page 64), or change to an external sensor which supports color (**7.2.6 Sensor Setup,** page 77) and try again.
20	An error dialog appears stating “Conformance test was stopped due to an error.”	■ Check whether the sensor and the display are connected. ■ Close any other application which may use the sensor.
21	An error dialog appears stating “Uniformity test was stopped due to an error.” Check that the external sensor is connected and close any other applications using the sensor.”	■ Check whether the sensor and the display are connected. ■ Close any other application which may use the sensor.

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No	Occurrence/Error	Solution
22	An error dialog appears stating “Display Matching aborted with error."	■ Confirm that the external sensor and the display are connected. ■ If a different application is using the sensor, close it. ■ Ensure that the target display’s luminance and color temperature can reach the same values as the source display. Confirm the range for each item in the user manual of each display model. Run **Display Matching** again with displays with the same capabilities and roughly the same usage hours.
23	An error dialog appears stating “Display Matching failed. White Luminance did not reach the target or failed to set the target curve."	■ Ensure that the target display’s luminance and color temperature can reach the same values as the source display. Confirm the range for each item in the user manual of each display model. Run display matching again with displays which have the same capabilities and roughly the same usage hours. ■ The target curve of the source display may not be appropriate. Call up the **Calibration Start** dialog with **Calibration**, and perform a separate calibration on each individual display. See **7.2 Calibration** (page 54). Then start **Display Matching** again.
24	An error dialog appears stating “No External Sensor detected.”	■ Confirm that the external sensor and the display are connected. ■ If there is another application using the sensor, close it.
25	An error dialog appears stating “CSV export failed. Check the destination and try again.”	■ Check that the destination folder is not read-only and then try again.
26	An error dialog appears stating “Writing test data failed. Please check access permission.”	In the backup schedule dialog, the data could not be written to the destination. ■ Change the backup destination or check that the destination folder is not set as “read-only” and try again.

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No	Occurrence/Error	Solution
27	An error dialog appears stating “Could not open file.”	HTML or CSV export failed in the QA Test Reports dialog box. ■ Check that the destination folder is not set as “read-only” and then try again.
28	An error dialog appears stating “Communication with the Event Logger Server failed.”	There was no response from the server. ■ Check that the client system and server system were able to obtain IP addresses, and that the specified server address is correct. Refer to **7.7.1.2 Reinitialize System Configuration** (page 108).
29	An error dialog appears stating “Communication with the Event Logger Server failed. No vacant license on the server side.”	The number of available licenses in the **GammaCompMD QA Server** is exhausted. ■ Contact your **GammaCompMD QA Server** Manager.
30	Communication with the Event Logger Server failed. Incorrect version of server found.	The software version of client(s) and server is different. Please update either all **GammaCompMD QA Clients** or the **GammaCompMD QA Server** to use the same Version to enable proper communication.
31	Schedule execution is not performed.	■ Check that the Pause box is not checked for Network Test or Schedule Test in Network Setup. Uncheck the box for the schedule you wish to execute and try again. Refer to **7.7.1.6 Network Execution Setup** (page 122). ■ Check that the main window and QA test dialog box are not open. If they are, close them and try again. ■ If a password is needed to turn off the screen saver it cannot be turned off automatically.

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No	Occurrence/Error	Solution
32	An “X” appears in Target Display Setting in the display information area.	An “X” appears next to Target Display Setting if a display is connected with a different display configuration compared last time, or if the display is disconnected. ■ If the display has been changed back to the previous display configuration, click **Update Display Information** and check that the “X” has disappeared. ■ If you wish to apply a new configuration, you will need to **Reinitialize Display Configuration**. Refer to **7.7.1.1 Re-initialization of Display** Configuration (page 105).
33	A “**?”** (question mark) appears next to Target Display Setting in the display information area.	A “?” appears next to Target Display Setting if the resolution or coordinates of a display have changed since the last time, or if the display is not turned on. ■ If the display has been changed back to the previous display configuration, click **Update Display Information** and check whether the “?” has disappeared. ■ If you wish to apply a new configuration, you will need to **Reinitialize Display Configuration**. Refer to **7.7.1.1 Re-initialization of Display** Configuration (page 105).
34	An error dialog appears stating “Communication with the system service failed. The service may not have been started. An administrator account for the Operating System is required to start it manually. If you want to start the service, click OK.”	GammaCompMD QA Client cannot startup because the engine service (GCMDQAEngineService) is disabled. Click OK to the error dialog to start the engine service. Then manually start GammaCompMD QA Client.

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No	Occurrence/Error	Solution
35	An error dialog appears stating “Display Matching aborted with error. The measurement results of the source display does not fit to the target”	Display matching failed. It may be that either the measured brightness or chromaticity of the source display is not supported by the target display. Please prepare the target display that supports brightness and chromaticity of the source display.
36	An error dialog appears stating “The application was not able to automatically determine the technology of this display. In order to achieve the best possible color accuracy, select the display technology from the list below. Please refer to the display's documentation or contact the manufacturer if the display technology is unknown.”	GammaCompMD QA Client does not fully support this display model. Select a suitable display from “Display technology type:” list and continue the operation.
37	An error dialog appears stating “Display Matching aborted with error. Calibration not performed for the source display, or it is performed with the target curve that can not apply to the Display Matching. Please check the source display's target curve and perform Calibration.”	Display matching failed. There is a limit to the Display Function that can support the display of destination. Refer to **7.7.3.4 Display Matching** (page 139).
38	The server can’t communicate to client after activating the firewall.	The system service's port of the client may be blocked. Please check the port number of the system service setup. See **7.7.1.2 Reinitialize System Configuration** (page 108). Open this port via the Windows firewall or your firewall setup tool.

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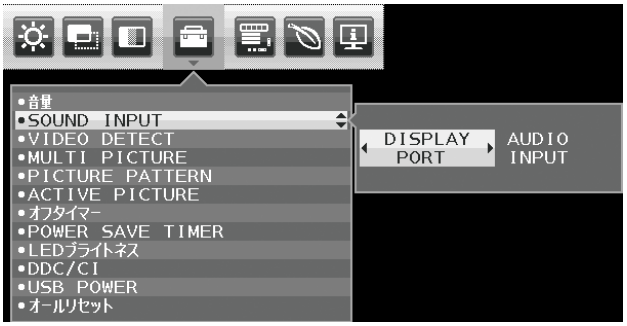
No	Occurrence/Error	Solution
39	When a NEC EA model is calibrated, which is connected via DisplayPort , the luminance is lower than the target luminance.	Select the "SOUND INPUT" on the OSD Menu. Touch the DOWN key of the UP-DOWN key and the INPUT key simultaneously. When displayed as EDID128, turn the display's power OFF and ON again. 
40	When a NEC EA model is calibrated which is connected via HDMI, calibration is failed.	Set the color format of the graphic card to RGB [0-255]. Set VIDEO LEVEL of Display to NORMAL.

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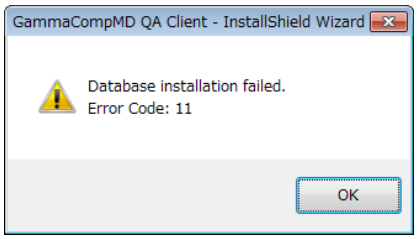
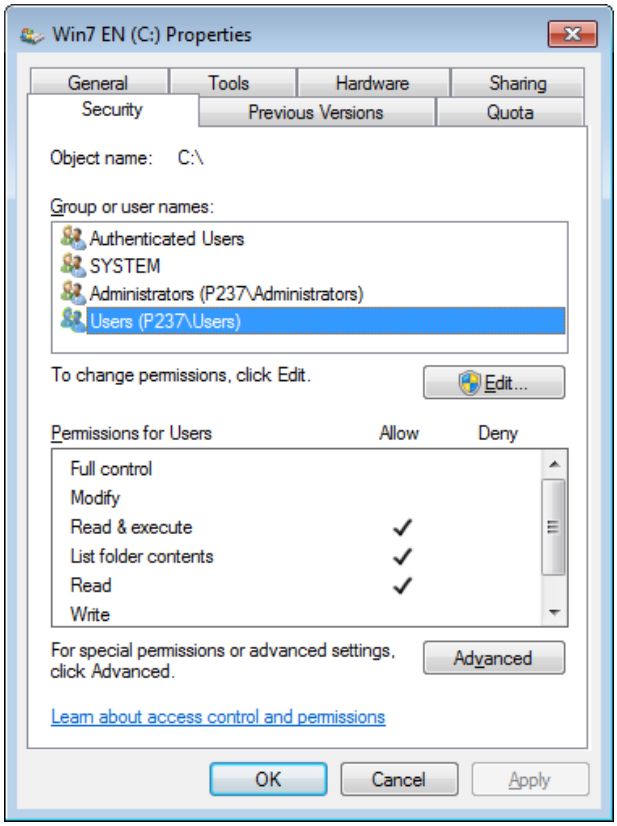
No	Occurrence/Error	Solution
41	When perform installation, "Database installation failed Error Code: 11" occurred. 	Confirm that there is the access permission of the "Users" group in c:/ProgramData folder.(it is hidden folder) If folder does not have access permission of “Users” group, add it. Confirm and edit in Security tab of ProgramData folder. 

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13. MD215MG EDID Serial Number Update Tool

13.1. Overview

The NEC model MD215MG is supported by GammaCompMD QA Client. All communication is performed via DCC/CI commands over a **USB cable**. Multiple MD215MG displays which are connected to the same system must be calibrated sequentially. The serial number of each unit is required to identify a MD215MG display. Normally it is stored in the EDID data of a display and retrieved and stored in the Windows registry during a system start.
In case of the model MD215MG, the serial number is not stored within in the EDID, but in a different storage location inside the display. This chapter instructs on how to read the serial number from the MD215MG and to store it in the **GammaCompMD QA Client** database, using the **MD215MG EDID Serial Number Update Tool**.

- **Operating System Environment**

Windows XP 32/64, Windows 7 32/64bit, Windows 8 / 8.1 32/64bit

- **Software Environment**

GammaCompMD QA Client Version 4.0.40 or later

- **Hardware Environment**

One or more MD215MG with connected USB cable(s) directly connected to the system.

NOTE:

- A daisy chain setup of the USB cables from display to display is not supported.
- USB 3.0 connections are not supported. Please use a USB 2.0 connector.
- Using this tool is a one-time action, as long as the display / display controller configuration is not changed.

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13.2. Hardware Setup

Connect one or more MD215MG display(s) to the workstation, using the DVI and USB cables provided.

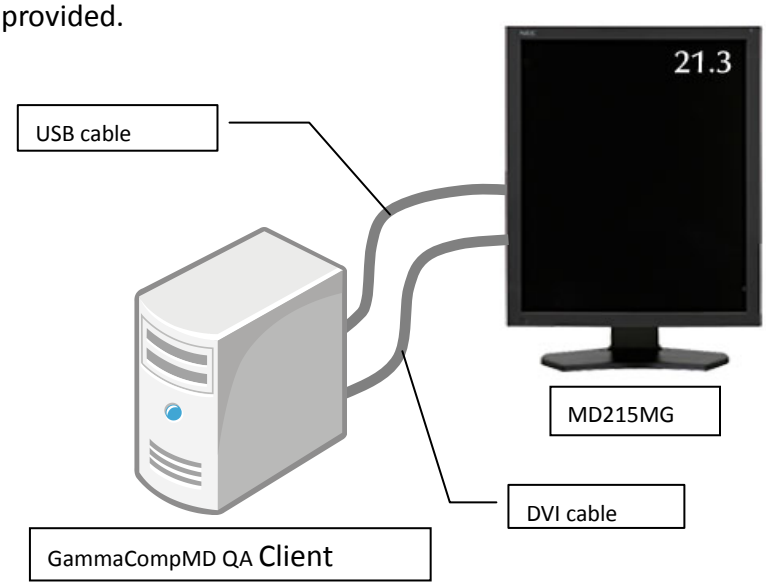

Figure 141: Connections

13.3. Software Installation

This tool is included in the **GammaCompMD QA Client** software package.
GammaCompMD QA Client must be installed prior to use.

13.4. Starting the Software

During the installation of **GammaCompMD QA Client** , this tool will be installed into the following default directory:

Windows 32-bit versions

C:\[**Program Files**]\NECDS\QA_Client**QADisplaySerialRewrite.exe**

Windows 64-bit versions

C:**[Program Files(x86)]**\NECDS\QA_Client**QADisplaySerialRewrite.exe**

Double-click on this file name to start the software.

13.5. Writing Serial Number(s) to EDID Data

The software will start and show **Detecting connected display(s)** (Figure 142).

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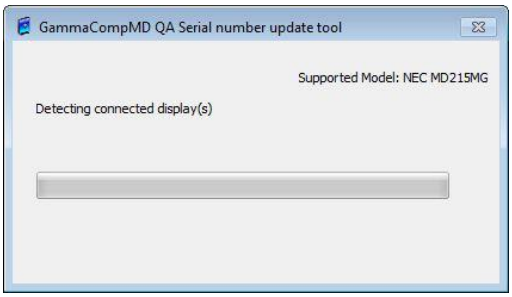

Figure 142: Detecting Connected Display(s)

The message **Start updating serial number** will appear after the display has been successfully detected (**Figure 143**)**.** Click OK to update the serial number.

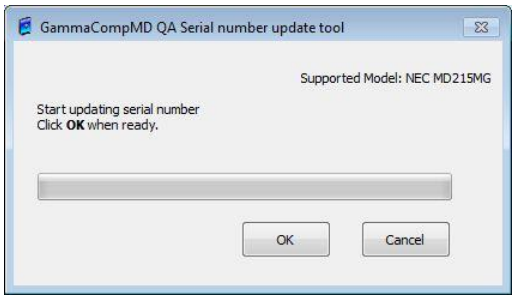

Figure 143: Serial Number Update Tool

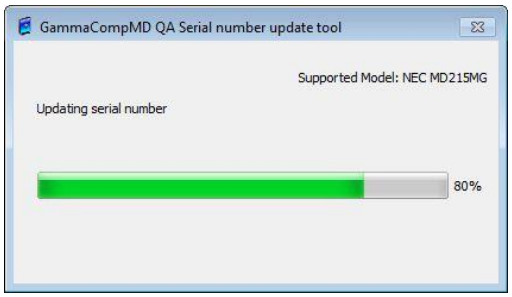

Figure 144: Updating Serial Numbers

Serial numbers will be updated for all displays currently connected. A dialog box will be displayed after a successful update (**Figure 145**).

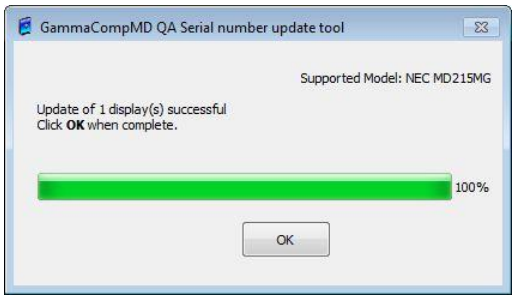

Figure 145: Update Successful

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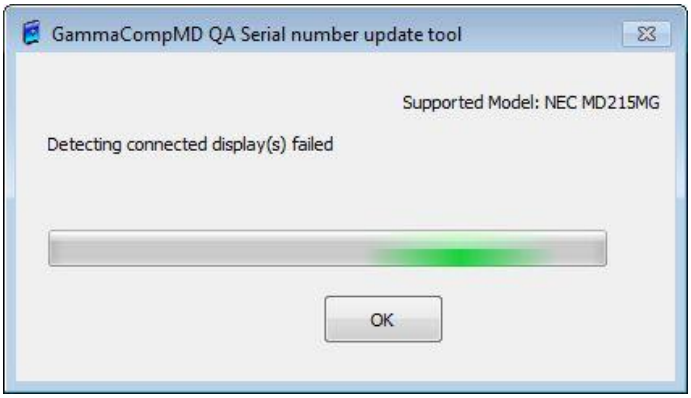
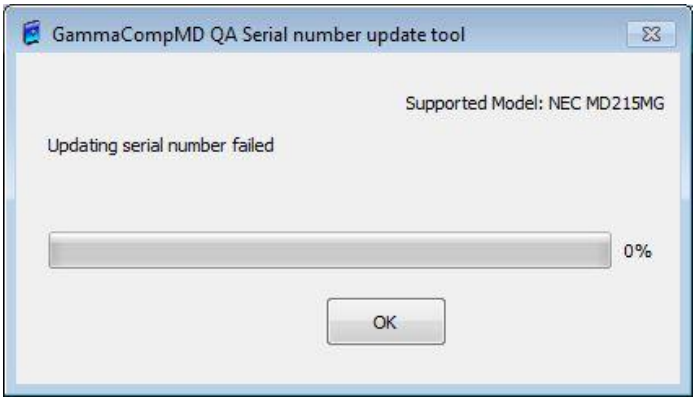
Update of *N* display(s) successful, Click OK when complete.

The value *N* will show the number of displays currently connected. (*N*=1 to 8)

13.6. Calibration

The model NEC MD215MG is now ready to be calibrated using GammaCompMD QA. Calibration can begin after GammaCompMD QA software has been started and the MD215MG display(s) have been identified.

13.7. Troubleshooting

No	Error Message, Event	Action
1		Unable to detect MD215MG display. Reconnect the display and try again.
2		Power has failed or cable has been disconnected during update. Check status and try again.

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14. Notes

14.1. Restrictions

If you are using **GammaCompMD QA Client** in multiple accounts, do not use the **[Windows] [Switch User]** function, but either **[Log off]** or restart your computer to change the login account.

14.2. Copyright Information

This product includes the following software:

- **QT 4.7**
- **PostgreSQL 8.4.17**
- **The Java(TM) Runtime Environment (JRE) JRE SE 6 update 24**

  Use of the Commercial Features for any commercial or production purpose requires a separate license from Oracle. “Commercial Features” means those features identified Table 1-1 (Commercial Features in Java SE Product Editions) of the Java SE documentation accessible at http://www.oracle.com/technetwork/java/javase/documentation/index.html
- **OpenSSL 1.0.0**

  This product includes software developed by the **OpenSSL Project** for use in the **OpenSSL Toolkit**.

  This product includes cryptographic software written by Eric Young. **(eay@cryptsoft.com)**

  This product includes software written by Tim Hudson. (tjh@cryptsoft.com)
- **Microsoft Visual C++ Runtime library 10.0.30319**
- **Apache Commons BeanUtils 1.7.0**
- **Apache Commons Collections 3.2**
- **Apache Commons Digester 1.8**
- **Apache Commons Lang 2.2**
- **Apache Commons Logging 1.1.1**
- **Apache Commons Math 1.1**
- **Apache Xerces-C++ XML Parser 2.7**
- **Apache Xerces-C++ XML Parser 3.0**
- **Apache Commons Daemon 1.0.5.0**
- **Qwt 6.1.0**

  This product is based in part on the work of the Qwt project (http://qwt.sf.net).

NOTE TO SIMULTRANS: PLEASE DO NOT TRANSLATE the Appendix “15.1. ACR AAPM SIIM Default rank.” Continue with “15.2. Saved Settings for Upgrade”.

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15. Appendix

15.1. ACR AAPM SIIM Default Rank

Model	LCD Type (PVA / IPS)	Pixel Pitch (N.NNNN mm)	Native Resolution	PbP Native Resolution	ACR Default Rank	Luminance Default	Black Level Default	White Point Default
EA193Mi	IPS	0.293	1280x1024	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA224WMi	IPS	0.248	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA234WMi	IPS	0.265	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA244WMi	IPS	0.270	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA244UHD	IPS	0.137	3480x2160	1920x2160 1280x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
EA273WMi	IPS	0.311	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA274WMi	IPS	0.233	2560x1440	1280x1440	Secondary	250 cd/m2	0.8 cd/m2	Native
EA275WMi	IPS	0.233	2560x1440	1280x1440	Secondary	250 cd/m2	0.8 cd/m2	Native
EA275UHD	IPS	0.155	3840x2160	1920x2160	Secondary	250 cd/m2	0.8 cd/m2	Native
EA294WMi	IPS	0.263	2560x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
EA304WMi	IPS	0.251	2560x1600	1280x1600	Secondary	250 cd/m2	0.8 cd/m2	Native
EA305WMi	IPS	0.251	2560x1600	1280x1600	Secondary	250 cd/m2	0.8 cd/m2	Native
LCDP221W	PVA	0.282	1680x1050	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD P402	PVA	0.461	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD P462	PVA	0.530	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD M401	PVA	0.461	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD M461	PVA	0.530	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD P401	PVA	0.461	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD P461	PVA	0.530	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD P521	PVA	0.600	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD S401	PVA	0.461	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD S461	PVA	0.530	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD S521	PVA	0.600	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD4020	PVA	0.648	1366x768	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD4620	PVA	0.746	1366x768	---	Secondary	250 cd/m2	0.8 cd/m2	Native

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LCD5220	PVA	0.600	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD6520L	PVA	0.744	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD6520P	PVA	0.744	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCDX461HB	PVA	0.746	1366x768	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCDX461UN	PVA	0.746	1366x768	---	Secondary	250 cd/m2	0.8 cd/m2	Native
Multeos M40	PVA	0.461	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
Multeos M46	PVA	0.530	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
X651UHD	IPS	0.372	3840x2160	1920x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
X841UHD	IPS	0.485	3840x2160	1920x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
X981UHD	IPS	0.562	3840x2160	1920x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
MD21GS-2MP (Blue Base)	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD21GS-2MP (Clear Base)	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD21GS-3MP (Blue Base)	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD21GS-3MP (Clear Base)	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD21M (LCD2190UXi medical model)	IPS	0.270	1600x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
MD210C2	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD210C3	IPS	0.216	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD211C2	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD211C3	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD242C2	IPS	0.270	1920x1200	960x1200	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD211G3	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD212MC	IPS	0.270	1600x1200	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD213MC	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD213MG	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
MD304MC (LCD3090WQXi medical model)	IPS	0.251	2560x1600	---	Secondary	250 cd/m2	1.2 cd/m2	Native

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MD301C4	IPS	0.251	2560×1600	1280×1600	Diagnostic	350 cd/m2	1.2 cd/m2	Native
MD322C8	IPS	0.182	3840x2160	1920x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
MD205MG	IPS	0.156	2048x2560	---	Mammography	420 cd/m2	1.2 cd/m2	
MD205MG-1	IPS	0.156	2048x2560	---	Mammography	420 cd/m2	1.2 cd/m2	
MD215MG	IPS	0.165	2048x2560	---	Mammography	420 cd/m2	1.2 cd/m2	
MD211G5	IPS	0.165	2048x2560	---	Mammography	420 cd/m2	1.2 cd/m2	
MD212G3	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
LCD1990SX	PVA	0.294	1280x1024	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD1990SXi	IPS	0.294	1280x1024	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD1990SXp	PVA	0.294	1280x1024	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2090UXi	IPS	0.255	1600x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2190UXi	IPS	0.270	1600x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2190UXp	PVA	0.270	1600x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2490WUXi2	IPS	0.270	1920x1600	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2690WUXi2	IPS	0.287	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2490WUXi	IPS	0.270	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD2690WUXi	IPS	0.287	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
LCD3090WQXi	IPS	0.251	2560x1600	---	Secondary	250 cd/m2	0.8 cd/m2	Native
P232W	IPS	0.265	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
P241W	IPS	0.270	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
P242W	IPS	0.270	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
PA231W	IPS	0.265	1920x1080	---	Secondary	250 cd/m2	0.8 cd/m2	Native
PA241W	IPS	0.270	1920x1200	---	Secondary	250 cd/m2	0.8 cd/m2	Native
PA242W	IPS	0.270	1920x1200	960x1200	Secondary	250 cd/m2	0.8 cd/m2	Native
PA271W	IPS	0.233	2560x1440	---	Secondary	250 cd/m2	0.8 cd/m2	Native
PA272W	IPS	0.233	2560x1440	1280x1440	Secondary	250 cd/m2	0.8 cd/m2	Native
PA301W	IPS	0.251	2560x1600	---	Secondary	250 cd/m2	0.8 cd/m2	Native
PA302W	IPS	0.251	2560x1600	1280x1600	Secondary	250 cd/m2	0.8 cd/m2	Native
PA322UHD	IPS	0.182	3840x2160	1920x2160 1920x1080	Secondary	250 cd/m2	0.8 cd/m2	Native
MD302C4	IPS	0.251	2560x1600	1280x1600	Secondary	250 cd/m2	0.8 cd/m2	Native
MD302C6	IPS	0.197	3280x2048 3072x2048	1640x2048 1536x2048	Diagnostic	350 cd/m2	1.2 cd/m2	
AVC2N0N	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC2N1N	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native

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AVC2N2N	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC2N3N	IPS	0.270	1920x1200	960x1200	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC3N0N	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC3N1N	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC4N0N	IPS	0.251	2560x1600	---	Secondary	350 cd/m2	1.2 cd/m2	Native
AVC4N1N	IPS	0.251	2560x1600	1280×1600	Diagnostic	350 cd/m2	1.2 cd/m2	Native
AVC4N2N	IPS	0.251	2560x1600	1280x1600	Secondary	250 cd/m2	0.8 cd/m2	Native
AVM2N0N	IPS	0.270	1200x1600	---	Diagnostic	350 cd/m2	1.2 cd/m2	
AVM3N0N	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
AVM3N1N	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
AVM3N2N	IPS	0.212	1536x2048	---	Diagnostic	350 cd/m2	1.2 cd/m2	
AVM5N0N	IPS	0.156	2048x2560	---	Mammography	420 cd/m2	1.2 cd/m2	

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15.2. Saved Settings for Upgrade

Section	Setting	Saved for upgrade?	Issue
Display Overview	Display Models	Saved	When there is a model previous GammaCompMD QA wasn't supporting, the information is saved.
Display Overview	Display Order (Rearrange Displays)	Saved	If the composition is changed, warning is indicated.
Display Overview	Alert Log	Saved	
Display Overview	Display Calibration Reports	Saved	
Display Overview	Display Conformance Reports	Saved	
Display Overview	Display QA Test Reports	Saved	
Calibration	Calibration Schedules	Saved	
Calibration	Calibration Settings (Calibration Setup)	Saved	When there is a model previous GammaCompMD QA wasn't supporting, the information is saved.(Target is 200cd/m2)
Calibration	Sensor Setup	Saved	
Calibration Sensor Setup	Display Sensor Reference Calibration	Saved	Correction value for built-in sensor is saved on the display. Correction value and assignment information for MD-N2M5B are saved on GammaCompMD QA
Conformance Test	Conformance Test Reports	Saved	
QATest	QA Test Setup	Saved	
Test Pattern	Test Pattern Setup	Saved	
Administrator	System Configuration (Initialize System Configuration)	Saved	DB port No. will be re-configured automatically.
Administrator	Language Setup	Saved	
Administrator	Asset ID Setup	Saved	
Administrator	Alert Setup	Saved	

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Administrator	Network Execution Setup	Saved	
Administrator	Backup Schedule Setup	Saved	
Administrator	Access Rights for Quality Assurance	Saved	
Administrator	User Password Setup	Saved	
Administrator	Startup User Level	Saved	
Administrator	White & Black Luminance Measurement Reports	Saved	
Administrator	Uniformity Test Reports	Saved	

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15.3. How important is Reference Calibration?

Whenever any parameter in the **Calibration Setup** menu was changed and the display configuration includes displays with integrated front sensors or retractable sensors, a message pops up, as shown in as shown in **Figure 146.**

Warning
Information
Reference Calibration in the **Sensor Setup** menu is highly recommended before using display sensor(s).
OK

Figure 146: Reflected Luminance Setup dialog box

Reference Calibration is highly recommended to improve two items:

- **Color temperature matching of two or more Color Displays at the installation site**

Automatic color temperature matching – **Color Matching** in short - of two or more same model color displays is now made possible by means of **Reference Calibration**. This requires an external sensor as the common reference for all display sensors of a configuration.
For correct **Color Matching**, a common **Color Chromaticity Target** is required, as shown in **Figure 148:**

- Set **White Luminance Calibration Mode** to i.e. "**6500K**", "**7500K**", "**Clearbase**" or "**8200**".
- Set the **Chromaticity Tolerance limits** (x,y) to "0.0025" and "0.0025", min. "0.0015" and "0.0015"

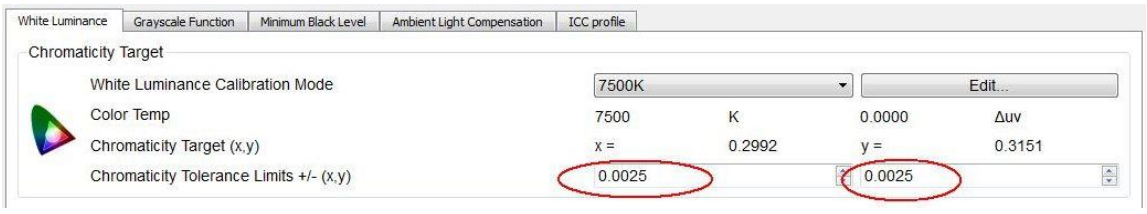

Figure 147: Example for Chromaticity Target settings

For good color matching results, is important to reduce the default **Chromaticity Tolerance limits** (x,y) from "0.0040" to "**0.0025**" or even down to "**0.0015**". This narrows the allowed sensor measurement tolerance, resulting in good color matching. However some physical limitation to this automated approach exists: A trained human eye is more accurate to detect color differences than any color sensor - as used for this purpose - ever can be.

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- **Regular re-adjustment of integrated front sensors or retractable sensors**

It is a common physical phenomenon that all light sensors lose their sensitivity over time when a light source emitting some ultraviolet light is measured permanently. The backlights of LCD Displays contain some small part of ultraviolet light, causing the plastic cover material of such a sensor to deteriorate. The sensitivity of the sensor will be reduced over time. This results in reduced measurement accuracy when performing i.e. a DICOM conformance test.

A **Reference Calibration** provides a re-adjustment of the front sensor and improves the measurement accuracy again. In case of displays with integrated front sensors, the new reference values are stored in the display.

- **Recommended time interval for Reference Calibration**

  - At time of installation and first calibration
  - Then regularly every 24 months – in case of a high amount of active usage hours of the display, shorter time intervals are recommended
  - MD215MG (5MP) regularly every 12 months – in case of high active usage hours of the display, shorter time intervals are recommended

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NOTE: In case of models MD212G3, MD215MG, MD211G5 and MD302C6, a **Reference Calibration** of the front sensor is performed automatically during calibration with an external sensor. Therefore the **Reference Calibration** button, as described in **7.2.6 Sensor Setup**(page 77) is disabled for these models.

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For your installation notes:

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